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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Costs of Chemical Production

OUR readers may recall an interview we recently published with Mr. C. R. DeLong, chief of the Chemical Division of the United States Tariff Commission, on his arrival in this country with other members of the staff, to inquire into the costs of production of various chemicals for the purpose of fixing their value for tariff purposes. Mr. DeLong, we learn, is now back in America after a four month's study of the chemical industries of England, Norway, Germany, Switzerland, France, and Holland, and when the Commission opened its formal inquiry respecting sodium nitrite this week it had the advantage of first-hand information in regard to production conditions and costs. The chemicals included in the inquiry were sodium nitrite (Germany and Norway), barium peroxide (England, Germany, and France), oxalic acid (Holland and Germany), potassium chlorate (Germany and France), veronal (Switzerland) linseed oil (England and Holland), and cresylic acid and phenol (England and Germany).

While it was not possible in every case to obtain actual data as to costs, considerable information was obtained regarding power and labour expenditure, raw material resources, etc. Generally the manufacturers whose American agents are petitioning for a modification of the tariff showed every desire to co-operate with the Commission's representatives,

their plants being thrown open to inspection and their costing sheets disclosed. In some cases, however, where the European manufacturer had little prospect of gaining by the disclosure of such information but little disposition to co-operate was shown. It is satisfactory to hear that the British chemical industry proved the most friendly to the Tariff Commission's representatives, while most difficulty was met with in France. The actual cost of producing linseed oil was obtained in England from firms representing approximately 75 per cent. of our crushing capacity. Comparable data on Dutch production were also obtained. In the case of barium peroxide, for which both increases and decreases in duty are petitioned, cost figures were obtained in England, France and Germany. The Swiss manufacturers of veronal supplied the commission with the information desired, as the British producers did in the case of cresylic acid and phenol. On the other hand, both French and German producers of potassium chlorate refused to reveal their production costs. Mr. DeLong and his party made a thorough inspection of the works of the Norwegian Hydro-Electric Co., Ltd., of Christiania, where nitric acid and calcium nitrate and sodium nitrate are made by the arc process in the Birkeland-Eyde furnaces. Although actual costs were not available, figures were obtained for power and raw material costs that will enable the Commission to form an estimate of the cost of producing sodium nitrite. Oxalic acid plants using the synthetic (carbon monoxide-sodium formate) process were visited in Holland and Germany and actual production data obtained. Mr. M. C. Donk, the chemical expert attached to the mission, will remain in Europe for several weeks to complete investigations into the costs of linseed oil production.

A Remedy for Grit Emission

A CORRESPONDENT who was interested by the remarks which we made in these columns in our issue of August 25 in reference to the new Smoke Abatement Bill, draws our attention to some experiences with which he has met during the past five years in connection with the difficult problem of precluding the emission of gritty particles from industrial chimneys. He points out that his own experience in a fairly thickly populated district in the working-class area of a large town is one which is likely to become comparatively general in the event of the new Bill passing into law; and the fact that, after many unsuccessful attempts, he has at last discovered an effective dust arrester may prove welcome information to works managers who are already in the throes of, or who anticipate, trouble from those who live in the neighbourhood of factories.

In our own comments on the subject it was stated,

now that the necessity for preventing what in the future will constitute a nuisance has arisen that we shall probably find the inventor equal to the occasion, and from what our correspondent tells us it would seem that the inventor has forestalled the need. In the case in question a number of attempts were made to remedy the trouble with apparatus of the mechanical type; but in all instances it was found that when dust-arresting was complete the chimney draught was interfered with, or conversely. It seemed, in fact, almost impossible to obtain a device which combined the necessary effect of retaining, say, 90 per cent. of the suspended solid matter, and at the same time was not responsible for a draught reduction exceeding 5 per cent. Eventually our correspondent came upon a fuel engineer who had designed an arrester combining the principle of angular deflection with variation of speed and areas, the arrangement proving eminently satisfactory from every point of view. Possibly, there are many of our readers who are being faced with similar problems, and if the matter is of interest to them we shall be glad to put them in touch with our correspondent.

The Machinery Exhibition

THE Shipping, Machinery and Engineering Exhibition now open in London at Olympia, contains much of interest for the industrial chemist, particularly the chemical engineer. The scope of such a show, as is shown by the title, is very wide, and Olympia is one of the largest halls available for purposes of the kind, particularly as the new annex, consisting of a hall nearly as large as the main building itself, is now open. In the new hall itself there is a special display of motor boats, internal combustion engines and accessories, organised by the Society of Motor Manufacturers and Traders, Ltd. Upstairs in the gallery there is little to detain the chemist, unless it is the whistles of those who have some marvellous minor invention or other to sell. In the main body of the hall, however, there are many exhibitors showing machinery and devices which will repay investigation by the industrial chemist. To give some idea of these it may be mentioned that boilers, furnaces, economisers, water softeners, filters, grinding mills, and similar devices form the bulk of the exhibits, while electrical devices and oxygen and acetylene plant are prominent.

The Exhibition has, of course, a certain appeal to the public, and is very fairly attended. Though the number of business men could not be expected to be enormous in the present time of uncertain trade, it is obvious that where any practical innovation is exhibited not only are inquiries frequent, but they usually result in orders. It is probably true that periods of depression in trade stimulate scientific progress, because it is necessary to introduce efficient and economic methods into manufacturing processes in order that profits may be made. This is quite apart from another factor which operates in the same direction, which may be expressed by saying that if individuals have difficulty in obtaining productive employment they will turn to the notoriously unproductive occupation of inventing things, to the ultimate benefit of all concerned. There are now-a-days in

exhibitions of this kind always one or two such innovations, and the present case is no exception. It is clear that at the moment they do not lack encouragement, and if worthy they should survive.

The Disaster to Japan

THE earlier and more excited accounts of the awful disaster which has fallen upon Japan are unhappily too fully confirmed by the more exact information which is now beginning to come through. Tokio and Yokohama, together with several smaller centres, have been practically demolished, and it is estimated that two years at least will be required to repair the damage. The Japanese people, in their rapid emergence from an exclusive eastern race into a first-class world power, have shown an energy and resource almost without parallel, and the situation with which they are suddenly confronted will call for courage and endurance of a rare order. In the enormous task of reconstruction, they are fortunately already assured of the sympathy and help of the whole civilised world, and in the friendly efforts at relief Britain and America are worthily leading the way. Japan has already done such wonderful things that few will doubt her capacity to overcome even this appalling trial.

As statistics published in this issue show, Japan has already a considerable connection with British chemical industry. We, more than any other nation, have encouraged and assisted her advance, and it is natural that for so many of the chemical products needed for the development of her agriculture and industries she should look to British markets. Of late, in many directions, Japan has been taking steps towards supplying her own needs and even towards competing in neutral markets. The latter tendency will be severely checked by the destruction of two of her principal cities, involving heavy financial burdens, and for a time she must revert to dependence on outside sources. In the work of reconstruction plant and chemical products will be required on a new scale, and Japan will be regarded in the double character of a loyal ally needing all the sympathy and help that can be spared and of a customer largely dependent on British industrial resources for the restoration of her own industrial life.

Erroneous Platinum Assays

THE fanciful prospects of extremely profitable platinum production in the United States suffer badly at the hands of the Bureau of Mines, whose experts tell us frankly that the country only produces a few ounces of platinum a year, and warns the too credulous public against some absurdly high claims recently put forward. Numerous samples of alleged platinum-bearing ores have been examined by official assayers, and not only have these failed to disclose the presence of platinum in appreciable quantities, but definite evidence has been obtained of the "salting" of samples with platinum wire and foil. The plain conclusion of the expert staff is that the United States has "no important resources of platinum—at least none which is at all likely ever to supply the nation's demand or any considerable fraction of it." Under 1,000 oz. a year is certainly

not a supply to boast of when the country needs ten to fifteen times that quantity. Shortly, the verdict is that "the case of platinum is a parallel with those of tin and nickel—this country has no tin or nickel resources of significance."

That platinum is to be found in the United States in minute quantities is undisputed, and a note on the assay methods may not be without interest. The returns show that while mistakes are common they are nearly always in the direction of too high a platinum content. This, it is to be feared, generally agrees with professional practice, for very rarely indeed does the expert who is consulted by the company promoter or the prospector understate the attractions. It is no surprise to hear that the correct determination of platinum in small quantities is by no means simple. As the methods employed are those of fire assay, similar to those used for gold and silver, the prospector or others naturally seek custom assayers for the determination of platinum. Incorrect platinum returns, we regret to learn, have been made by chemists, not because they are lacking in honesty, but because of the "fanciful methods" they adopt. The result of all these conditions is a substantial increase in the number of assayers turning out erroneous platinum returns, and a consequent temptation to investors to cast upon the waters bread that probably will never more return.

Paper Pulp from Straw

SOME interest was aroused by a recent reference in these columns to some contemplated large-scale experiments at Northfleet, Kent, for the chemical treatment of waste straw for conversion into paper pulp. In connection with this scheme, Sir Frederick Becker, who has introduced much Canadian pulp on the British market, is now in Canada making further investigations. In a statement on the subject before leaving England, Sir Frederick Becker pointed out, as a striking fact concerning the millions of Canadian acres under cultivation, that practically the whole of the enormous yield of straw is a waste product, a good proportion of which is annually burnt. If, however, the experiments to be carried out in Kent are as successful on the big scale as they have been in France, he estimates that it will be possible to buy all the straw from the Canadian farmer and convert it into pulp in the Prairie Provinces for the manufacture of high grades of paper. "Evidently," he states, "we have here the seedling of a gigantic new industry which will benefit the man on the homestead, give employment to thousands of pulp and paper-makers, and offer a further attraction to intending emigrants. But it will do more than that: it will bring nearer that ideal of a self-supporting British Empire so eloquently advocated at the last Empire Press Conference." The subject, we understand, is likely to come up for consideration at the Imperial Economic Conference in London in October.

The Late Dr. Muspratt

In the death of Dr. E. K. Muspratt the city of Liverpool has lost an honoured citizen, British chemical industry a representative leader, and public life a high-minded public man. In his early days a sincere

student of science, in maturer years a capable business man with a balanced appreciation of both science and industry and their mutual relations, he never allowed either science or business to cramp his intellectual outlook and social sympathies. He lived to a great age, and in a great age, and not many men, even in so long and busy a career, touch life at so many points or remain alive to such varied interests. The diversity of his personal associations is sketched convincingly by Mr. T. P. O'Connor, M.P., who knew him on both the political and the personal sides. Yet all through he remained steadfast to a simple faith, in which liberalism in the broadest sense was a central article. Any industry is the richer for such a character and life, and by him, as by other members of his family, both of preceding and of following generations, the British chemical industry has been permanently enriched. The standard set by such men gradually passes into a family tradition, which is at once a source of pride and a call to high public service. In the case of the Muspratts the tradition is still, and promises long to be, in safe keeping.

Points from Our News Pages

- The first of a series of articles on "The photo-sensitising dyestuffs" is published from S. Ellingworth, M.Sc. (p. 250).
Our correspondence includes letters from R. Brightman, E. P. Morris, and Boots Pure Drug Co., Ltd. (p. 253).
Notes are published on exhibits of interest to chemists and chemical engineers at the Shipping, Engineering, and Machinery Exhibition (p. 255).
A sketch appears of the career of the late Dr. E. K. Muspratt (p. 258).
The fourth instalment of "Random Reflexions" deals with "Colloids—their cranks and wiles" (p. 259).
In view of the disaster in Japan, statistics are given indicating the extent of Japan's imports of British chemicals (p. 260).
Our London Market Report states that an improvement in demand for chemical products has been noticeable and a fair amount of business has been put through (p. 267).
The heavy chemical market shows little improvement, but the prices of home products are fairly steady, according to our Scottish Market Report (p. 270).

Books Received

- PRACTICAL CHEMISTRY. By H. B. Dunncliff. London: MacMillan and Co., Ltd. Pp. 280. 5s.
INDUSTRIAL FILTRATION.—By Arthur Wright. New York: Chemical Catalog Co., Inc. Pp. 336. \$5.00.

The Calendar

Aug. 31 to Sept. 22 Sept. 10-13	Shipping, Engineering and Machinery Exhibition.	Olympia, London.
12-19	Institute of Metals: Annual Meeting.	Manchester.
17	British Association for the Advancement of Science: Ninety-first Annual Meeting.	Liverpool.
17-18	Institution of Rubber Industry. 8 p.m.	Engineers' Club, London.
Oct. 5	Iron and Steel Institute	Milan
6	Society of Chemical Industry (Manchester Section): "Recent Progress in Chemistry," by Dr. H. Levinstein.	Manchester.
	West Yorkshire Metallurgical Society: Annual Meeting	Huddersfield

The Photo-Sensitising Dyestuffs.—(I)

By S. Ellingworth, M.Sc.

The discovery and application of the photo-sensitising dyestuffs represents one of the most recent and notable advances in the industrial development of organic chemistry. The modern examples form an important and novel series of compounds capable probably of wide development and application in the future.

THE almost complete misrepresentation of the relative intensity, or brightness, of coloured objects as recorded by the ordinary photographic plate, when compared with the human retina, has long been recognised as a serious deficiency of the former. This is due, as is well known, to the indifference of the ordinary sensitive emulsion to the more refrangible yellow and red rays of the spectrum, whereas to the eye such rays frequently produce the most vivid impression.

The first discovery that this anomaly could in some measure be rectified by staining the sensitive film with certain coal tar dyes was made by Professor H. W. Vogel, of Berlin, in 1873, and the effects of large numbers of dyes have since been examined by numerous workers both in Germany and in this country, with the result that the outstanding efficiency of certain classes of dyestuffs has been established. Previous to 1914, the manufacture of these special sensitisers was carried on practically exclusively in Germany, but in the succeeding war years the great advantages of satisfactory ortho-chromatic and panchromatic plates for such purposes as aerial photography, for example, gave rise to and stimulated efforts in both Britain and America to produce the necessary materials. Special mention is due to the work carried on under Sir W. J. Pope in the chemical laboratories of the University of Cambridge, where quantities of the dyestuffs required for commercial purposes were actually made.

A considerable amount of valuable and interesting investigation has been recorded, though it is highly probable that much of the most important information remains the exclusive property of interested manufacturers. The earlier examination of numerous dyestuffs showed that several substances, all well known, were capable of imparting to the silver haloids sensitiveness to yellow and greenish yellow light rays. Thus aldehyde green, iodine green, chrysianiline, eosin, rose Bengal, erythrosin, and cyanine, were all found to impart extra-sensitiveness to the yellow and greenish yellow rays. In most cases, however, the *maximum* sensitiveness still lay in the blue and violet regions of the spectrum, and therefore the resulting plates still failed to harmonise photographic with visual intensity. Moreover, the *total* sensitiveness of the plates was sometimes actually diminished by the application of the dyestuff, so that in practice a longer exposure was necessary in order to bring out the special sensitising action imparted. The same disadvantage was incurred by the use of a red or yellow screen, interposed between the plate and the source of light, further to correct anomalous colour intensity. More satisfactory results were obtained by Bothamley, who by the aid of ammoniacal erythrosin, rose Bengal, and cyanine obtained plates showing greater sensitiveness to yellow and orange than to blue and violet rays.

Most of the above-mentioned colouring matters have now fallen to a position of little or no importance as sensitisers, although rose Bengal and erythrosin of the eosin type still find application as sensitisers for yellow and green. The original discovery of the sensitising action of eosin was made by Waterhouse about 1875, and this dyestuff was actually employed in 1884 in Edwards' isochromatic plates. By far the most efficient and interesting of the photo-sensitisers are the various groups of dyestuffs known generically as the "Cyanines," from the name originally given to the earliest discovered member of the series. This was apparently the substance with which Bothamley obtained his most successful results.

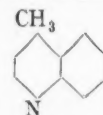
The Cyanines

The author has recently been interested in substances of this group as a result of the discovery (Browning, Cohen, and Gulbransen (*British Medical Journal* (1922), I, 514) that in addition to their sensitising properties, many of the cyanines possess very considerable antiseptic activity, and further possess the important property that their bactericidal power is not diminished by the presence of serum, as is usually the case. A new field of investigation in connection with these

materials has thus been opened out, and has as yet been only partially explored. The cyanines may be divided conveniently into several classes, all closely related chemically, and we shall now consider these in turn.

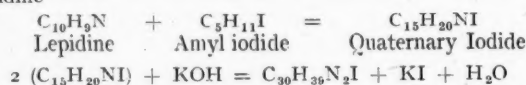
The first example of a cyanine dyestuff, which also gave its name to the whole group, was discovered in 1856 by Williams, who observed the formation of an intense blue coloration when acting on the alkyl quaternary derivatives of so-called "quinoline" with silver oxide. Further investigation led him to record that the product obtained from the amyl iodide derivative possessed the "greatest tinctorial power." Similar observations were made during the next year by M. von Babo, who produced blue cyanine dyes by the action of alkalies on "quinoline" metho- and etho-sulphates. Efforts were made to introduce these materials for ordinary dyeing purposes, but were doomed to failure owing to the fugitive nature of the colours, although the tints produced were said to be "second to none in brilliancy and purity of the several blues derived from coal tar." Cyanine was exhibited in 1861 and placed on the market by Menier of Paris. The discovery of the photo-sensitising properties of cyanine was, of course, of much later date.

The cyanines were further examined by Hofmann, who prepared and analysed the product obtained from the "quinoline" base, amyl iodide, and potash. The "quinoline" employed was prepared by the distillation of cinchonine with potash, and, as Hofmann showed, really contained both quinoline and lepidine (4 methyl quinoline)



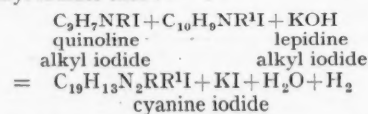
Lepidine

Further, on subjecting the cyanine to distillation he identified lepidine amongst the products, and finally ascribed to the substance the formula $C_{10}H_9N$, explaining its formation thus from two molecules of the quaternary amyl iodide of lepidine



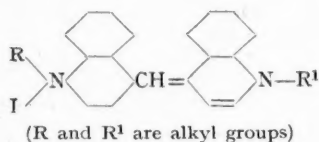
Certain "slight discrepancies" between the analytical results and the theoretical values were explained by the assumption of the presence of a small quantity of a similar compound derived from quinoline. $C_{28}H_{35}N_2I$, which hypothesis was supported by the identification of quinoline in addition to lepidine amongst the products of distillation of the cyanine.

Thus whereas Williams had supposed the cyanine to be derived from quinoline alone, Hofmann considered lepidine alone to be the basis of this substance, both of which views were subsequently shown to be erroneous. The fact that both quinoline and lepidine are necessary for the formation of cyanine appears first to have been realised by Hoogewerf and van Dorp (*Rec. Trav. Chim.* (1883), 2, 28; (1884) 3, 317), who ascribed to the cyanines the formula $C_{10}H_{13}N_2RR'I$ (where R and R' are alkyl groups) and represented their formation from equal molecular quantities of quinoline and lepidine alkyl iodides thus:—

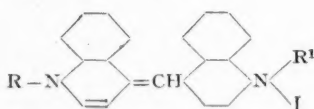


It may be noted that the foregoing work, as well as the discovery and development of other groups of cyanines, was greatly facilitated by the publication in 1880 of Skraup's

synthesis of quinoline, thus enabling that substance to be obtained free from the allied bases which were invariably present in the quinoline obtained from the two hitherto available sources, coal tar and cinchonine. The true constitution of the cyanine molecule, formed, as described by Hoogewerf and van Dorp, from quinoline and lepidine, was practically settled by the establishment in 1920 of the constitution of the isocyanines derived from quinoline and quinaldine (2 methyl quinoline). (Mills and Wishart, *Trans. Chem. Soc.* (1920), 117, 579). These investigators gave to the cyanines the formula



This constitution appears to be quite definite where the alkyl groups R and R' are identical, but if dissimilar the alternative tautomeric formula



is possible, the alkyl group R' being attached to the lepidine molecule in each instance.

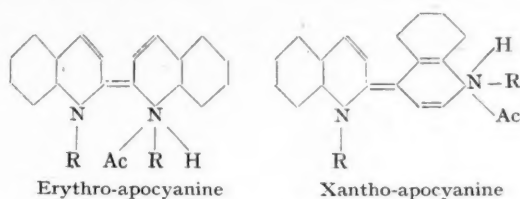
The cyanines did not attain to any great degree of importance as sensitizers, partly owing to their tendency to cause fogging and spotting, and partly owing to the discovery (Spalteholtz, *Ber.* (1883), 16, 1847; Hoogewerf and van Dorp, *Rec. Trav. Chim.* (1883) 2, 41; (1884), 3, 344) of the more efficient isocyanines. The "normal" cyanines form brilliant blue solutions in alcohol, and crystallise in monoclinic prisms possessing a green metallic reflex. The aqueous solutions are blue by reflected and green by transmitted light. The colour is discharged by acids, due to salt formation. Hofmann as early as 1862 prepared colourless or yellow cyanine salts containing one equivalent of halogen acid. Other halide salts have been obtained, containing two and three equivalents of acid.

The Apocyanines

The preparation of substances belonging to this group was described in a patent of Meister, Lucius, and Brüning (D.R.P. 154, 448, Friedländer (1903), 326). These substances differ from most of the other types of cyanine in that the combination of the two quinoline nuclei is not brought about through the agency of the reactive 2 or 4 methyl group, quinoline alkyl halides only being necessary for their formation. The condensation is best carried out in methyl alcohol solution, one molecule of a methyl alcoholic solution of alkali being added in two equal portions to the boiling methyl alcohol solution of two molecules of the quinoline quaternary halide. The reaction gives rise to two products, a sparingly soluble yellow or orange dyestuff, and a soluble red compound which crystallises from the alcohol in beautiful red needles with a brassy metallic reflex. The two apocyanines are easily separated by taking advantage of the difference in solubility in methyl alcohol. They differ from the other groups of cyanines in several respects. Their solubility in water is somewhat greater, and they are considerably more stable to acids and alkalis, being decolorised only slowly by the former. It is a curious fact that whereas unsubstituted quinoline alkyl halides give rise to the red compound in much greater quantity than the orange variety, para-substituted quinolines form almost exclusively the orange derivative. With meta-substituted quinolines the condensation does not take place.

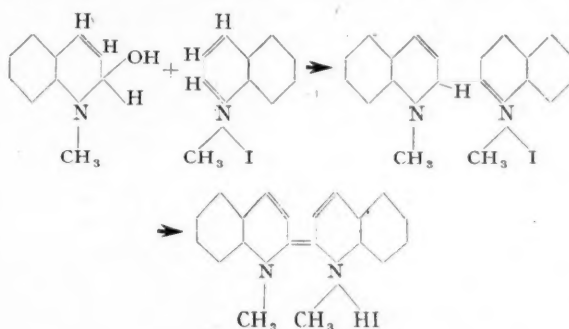
The use of sodium alcoholate in place of caustic soda is stated to increase the relative proportion of orange compound formed. Very little work appears to have been done concerning the constitution of these substances. Kaufmann and Strübin (*Ber.* (1911), 44, 694) carried out some experiments on the oxidation of the apocyanines, and obtained 2-2 biquinoyl derivatives from the red variety, or erythro-apocyanines,

as they were termed by these workers. For these bodies, and the orange compounds, or xantho-apocyanines, they suggested, though with all reserve, the following formulae:—



thus representing them as salts of bases containing two trivalent nitrogen atoms, both saturated.

Decker and Kaufmann (*J. für prakt. Ch.* (1911), 84 (ii) 240) suggested the following mechanism for the condensation:—



According to this formula, the character of the two nitrogen atoms and also their connecting linkages are somewhat different from the arrangement existing in all the other groups of cyanines, and the fact that their sensitising properties have not been regarded as very valuable may be considered to lend some support to the possibility of a variation in the system which exists in all the more powerful sensitizers. They were, however, originally patented as useful sensitizers, and in view of the fact that their production does not involve the preparation of complicated methyl quinolines, their non-success is somewhat unfortunate.

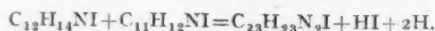
The Isocyanines

The isocyanines all form brilliant reddish violet solutions in alcohol, becoming redder on dilution with water. They crystallise best from methyl alcohol in the form of needles or prisms usually possessing a beautiful green metallic reflex.

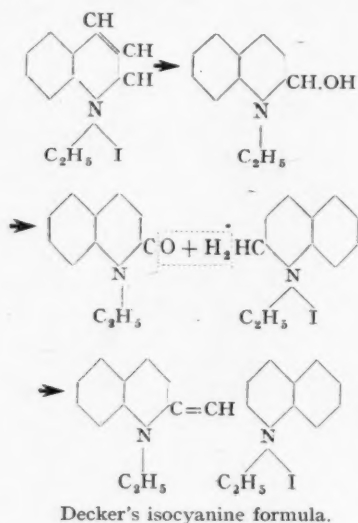
More attention has perhaps been devoted to the isocyanines than to any of the other groups, probably owing to the fact that the first really powerful red sensitizers belonged to this class of substance, and interest therein was stimulated. The sensitising action of "Ethyl Red," formed by the action of alkali on the ethiodides of quinoline and quinaldine, was observed by Miethe in 1903 (*Chemische Industrie* (1903), 26 (3), 54). Photographic plates stained with this dyestuff were of fairly uniform sensitiveness from the orange to the ultra-violet, and in addition were free from much of the fogging and spotting defects of previous orthochromatic plates. Still more powerful isocyanine sensitizers were subsequently placed on the market by Meister, Lucius and Brüning, under the names of Pinaverdol (from the methiodides of quinoline and 6 methyl quinaldine), Pinachrome (from 6 methoxy quinoline ethobromide and 6 ethoxy quinaldine ethobromide), and Orthochrome T. Bayer and Co. also manufactured sensitizers known as Perikol, Homokol and Isokol.

In view of the inability, previously mentioned, of meta-substituted quinoline alkyl iodides to undergo the apocyanine condensation, it is interesting to note that D.R.P. 167159 of 1903 (Meister, Lucius and Brüning) covers the preparation of isocyanines from both m-tolu quinoline and m-tolu quinaldine. Ortho-substituted derivatives do not, however, readily form isocyanines. These more powerful sensitising dyestuffs are employed in the manufacture of panchromatic plates, their activity extending into the red region of the spectrum.

An improvement in the sensitising action of the isocyanines has recently been claimed by Renwick and Bloch (*Phot. J.*, 1920, 60, 145), who state that by the addition of auramine to the sensitising dyestuff the tendency to produce fog is still further diminished. Some sensitising action is also effected by the auramine itself. It has previously been remarked that although the discovery of the value of the isocyanines as sensitizers did not take place until 1903, substances of this type had been known for many years, having been discovered independently by Spalteholz, and Hoogewerf and van Dorp (*loc. cit.*), who realised that the quaternary alkyl iodides of both quinoline and quinaldine took part in their formation, and expressed the reaction for the ethiodides thus:—

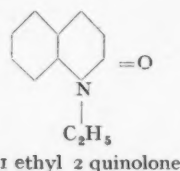


They gave the name "isocyanine" to the group, in view of the general resemblance of the product to Williams's original "cyanine." Subsequent to the discovery of their sensitising properties, much attention was devoted to the elucidation of their constitution. Following upon his discovery of the alkyl quinolinium pseudo-bases (Ber. (1891), 24, 692; (1892), 25, 3326), Decker made the suggestion that these bodies formed an intermediate stage in the formation of the cyanine dyes, the pseudo-base being oxidised to the quinolone, which then condensed with a molecule of unchanged quinaldine alkyl iodide.



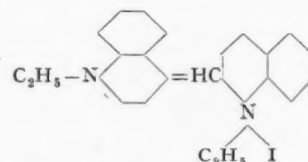
Decker's isocyanine formula.

The intermediate formation of a quinolone, and also the activity of the 2 methyl group of the quinaldine derivative, have always been regarded as essentials of the isocyanine condensation. Vongerichten and Höfchen (Ber. (1908), 41, 3054) obtained 1 ethyl 2 quinolone by the oxidation of diethylisocyanine chloride with alkaline potassium ferri-



cyanide, and also showed that certain quinaldine alkyl iodides in which the hydrogen atoms of the methyl group were substituted—e.g., benzylidene quinaldine ethiodide, 2 isopropyl quinoline methiodide—were incapable of undergoing the isocyanine condensation; both of which observations they regarded as evidence of the agency in the condensation process of the 2 methyl group of the quinaldine molecule. It has since been observed, however, that substitution in other positions prevents the reaction owing to steric hindrance, so that such evidence is not altogether conclusive. Miethe and Book (Ber. (1904), 37, 2008) had previously suggested the

formation from the quinoline molecule of a 4-quinolone as an intermediate stage in the condensation, a view which was accepted by König (*J. für prakt. Chem.* (1906), ii, 73, 100), whose formula



König's Isocyanine formula.

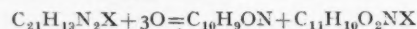
follows from the reaction of this quinolone with a molecule of quinaldine ethiodide.

It may be noted in passing that Miethe and Book recognised that the quinoline could be replaced by quinaldine in the formation of an isocyanine, and described the preparation of a dyestuff of this group by the action of alkali on quinaldine ethiodide alone. In addition they compared its sensitising action with that of ethyl red derived from quinoline and quinaldine. The view that the quinoline molecule was linked through the 4 position received support from the work of Kauffmann and Vonderwahl (Ber. (1912), 45, 1,404), who obtained from quinoline alkyl iodides substituted with chlorine in the 4 position the same isocyanines as from the corresponding chlorine free compounds, hydrochloric acid, as well as hydriodic acid, being eliminated.

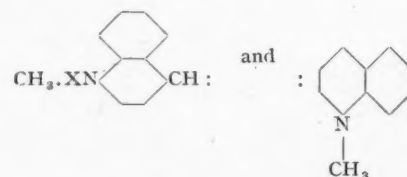
Mention may also be made of the work of Adams and Haller (J. Amer. Chem. Soc. (1920), 42, 2,389), who demonstrated that an isocyanine could be obtained from the alkyl halides of pure lepidine alone, by the action of alkali in hot concentrated alcoholic solution, which observation, coupled with that of Miethe and Book, just noted, that quinaldine alone gave rise to an isocyanine, affords further proof of the linking of the nuclei through the 2 and 4 positions.

The American investigators were the first to obtain a pink isocyanine from lepidine only, previous experiments with this material having produced blue dyestuffs, evidently owing to the presence in the lepidine of quinoline or quinaldine (both allowing the formation of a blue cyanine).

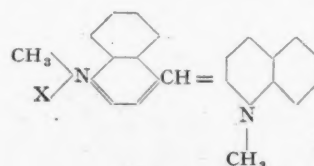
Convincing evidence of the constitution of the isocyanines was finally obtained by Mills and Wishart (Trans. Chem. Soc. (1920), 117, 579), who oxidised a solution of dimethyl isocyanine acetate with potassium permanganate and obtained from the resulting solution 1 methyl 2 quinolone, and cinchonic acid methochloride, both in good yield. Three and a half atoms of oxygen were consumed in the complete oxidation, which is represented by the equation



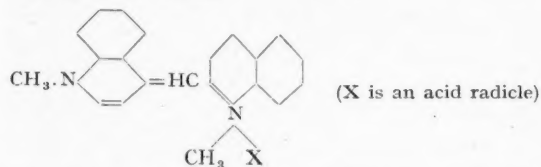
The extra half atom of oxygen is probably absorbed in side-reactions. If now the added oxygen atoms be subtracted from the two oxidation products the two residues remain:—



which on combination give as the formula of the isocyanine

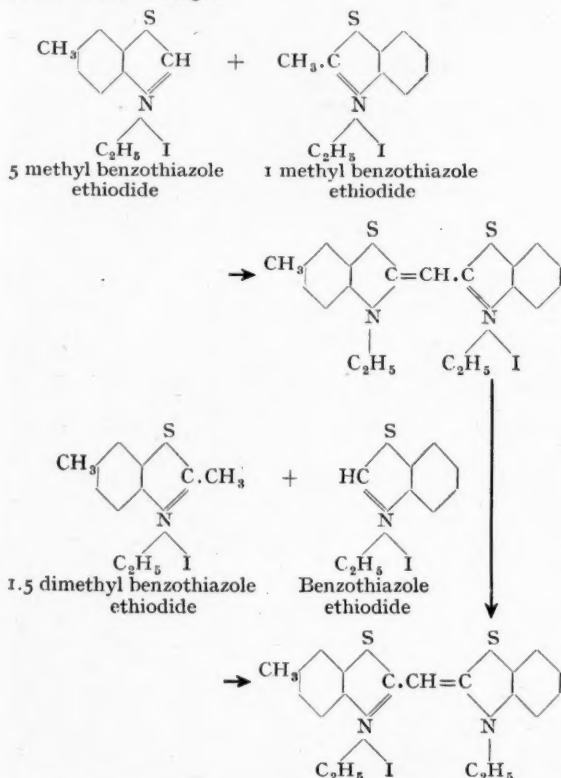


The possibility of the tautomeric formula (identical with that proposed by König)



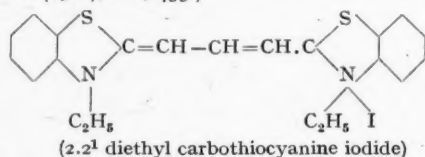
should not be ignored. Mills and Wishart regard both as possible, the actual configuration being probably determined by the relative positivity of the two quinoline nuclei, and the consequent selective attachment of the halogen to the more positive group.

The existence of tautomeric forms in the isocyanine series appears still more probable from the observations of Mills and Brauholtz (*Trans. Chem. Soc.* (1922), 121, 1,489), who in studying the very similar thiocyanines found that the products of condensation of 5 methyl benzo thiazole ethiodide with 1 methyl benzo thiazole ethiodide, and of 1,5 dimethyl benzo thiazole ethiodide with benzo thiazole ethiodide, were identical, showing conclusively the existence of tautomerism involving the transference of the iodine radicle from one nitrogen atom to the other, with corresponding adjustment of the double linkages.



The second formula is regarded as the more probable, as the nucleus containing the methyl group would probably be more strongly basic.

It may be mentioned that substances of this type, termed thiocyanines, as well as a further group derived from the same intermediates, the carbothiocyanines themselves exhibit very powerful photo-sensitising properties. (Mills, *Trans. Chem. Soc.* (1922), 121, 455.)



The Unemployed Chemist

SIR,—My attention has been directed to a statement in an editorial note of your current issue, under the heading, "The Case of the Unemployed Chemist."

After referring to Mr. W. Rhys-Davies's letters "to some of the Northern dailies," you describe my editorial in the latest Bulletin of the British Association of Chemists as expressed "in terms so remarkably similar as to point to a common authorship." I trust that you will allow me to contradict the suggestion in this statement. I have seen none of the letters to which you refer and so far as I am concerned the statements are entirely independent. My own editorial was written and sent to our Publications Committee for approval on July 5 and published on July 23 last. If the extraordinary similarity of the wording in the two documents suggests plagiarism it will be for Mr. W. Rhys-Davies to clear himself of that charge.—I am, etc.,

R. BRIGHTMAN, Hon. Editor.

69, Devonshire Street, Higher Broughton,
Manchester, September 4.

[If our correspondent has seen our editorial note, he must surely have seen also in the same issue the letter of Mr. W. Rhys-Davies, and if he will compare this with the first portion of the "Editorial" in the B.A.C. Bulletin he will have no doubt as to the remarkable similarity of the two productions. We apportioned no blame in the matter, but merely pointed out a curious fact.—ED. C.A.]

The Finance of Dye Manufacture

To the Editor of CHEMICAL AGE.

SIR,—The commercial principles applicable to dye makers' balance sheets are not unique. In mining enterprises provision has to be made for wasting assets; the profitable life of a mine is limited. Large provision from gross revenue must be made to keep intact the capital; development of new areas is essential for the continued existence of the business.

The provision for obsolescence in mining is not an allocation out of profit earned, but a deduction from gross profit before there can be any net profit for the shareholders. Similarly, in dye manufacture, provision must be made for the obsolescence of processes before any real profit accrues. In so far as expenditure on research is for the replacement of obsolete methods or dyes it does not come out of profits, but before there is any divisible profit. If the earnings do not cover a due provision for this obsolescence there is an actual loss, although a balance sheet ignoring this item would indicate a profit divisible amongst the shareholders. Unfortunately, it is not compulsory or conventional for chemical companies to issue a certificate from a qualified technical person that proper allowance has been made for obsolescence in the balance-sheet analogous to a mining engineer's.—Yours, etc.,

E. F. MORRIS.

4, Albert Square, Manchester,
September 1.

Chloramine—T

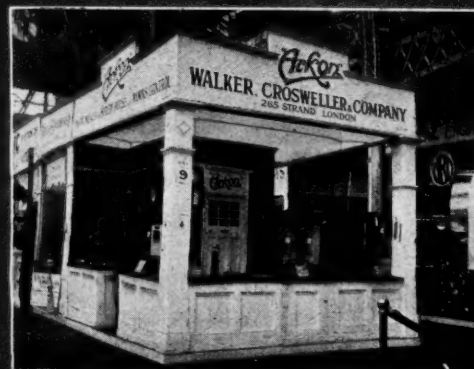
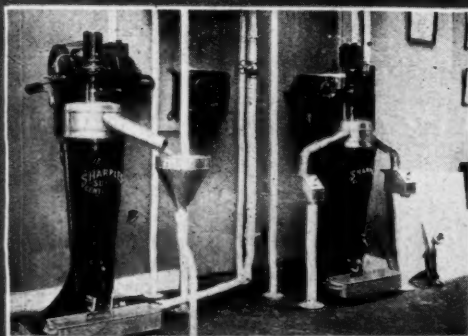
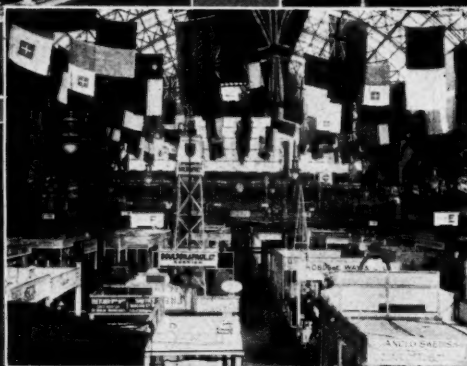
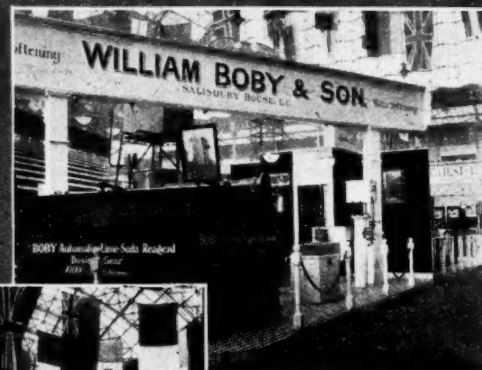
To the Editor of CHEMICAL AGE.

SIR,—The article in your issue of August 18, 1923, on "The manufacture and uses of Chloramine T" is a most interesting exposition, but does not describe the situation in this country with accuracy. Our position as the largest makers of British saccharine has enabled us since 1916 to meet all demands for Chloramine antiseptics. As the enclosed literature will show, we supply Chloramine T in the form of powder, 8.75 grain tablets, 43.75 grain tablets, tablets containing sodium chloride, and in the form of gauze and cream. We are in entire agreement with the author of the article regarding the excellence of the Chloramine group of antiseptics; in our opinion, Chloramine T is unequalled as a stable source of chlorine in active non-irritant form, and is undoubtedly one of the best antiseptics we have at our disposal to-day.—Yours, etc.,

BOOTS PURE DRUG CO., LTD.,
W. J. Bowis, Director.

August 29, 1923.

Some of the Stands at the Machinery Exhibition



Shipping, Engineering, and Machinery Exhibition

New Inventions and Improvements at Olympia

ABOUT three hundred and fifty engineering and other firms, from all parts of Great Britain, have combined by the exhibits of their specialities to make the Shipping, Engineering, and Machinery Exhibition at Olympia an outstanding feature in the world of science and technology during the current year. The exhibition was opened by Viscount Curzon, M.P., on Friday, August 31, and the general opinion left no doubt that it was a distinct advance on any of its predecessors. The organisation of the varied displays is as complete as could be wished. It has been computed that between the opening and the closing date, September 22, a larger number of visitors will have been present than at any previous effort of the kind. Among the exhibitors are the following well-known firms, whose specialities are arresting the interested attention of thousands of visitors to Olympia. A very large proportion of the machinery is daily in operation.

Notes on Exhibits

Babcock and Wilcox, Ltd., Oriel House, Farringdon Street, London, E.C. (Stand 4, Row D.).—This well-known firm have on view, and at work on their Stand, No. 4 D, in the main hall, a number of their productions, including their mechanical chain grate stoker of the compartment type; models of land and marine types of water-tube boilers; a jib crane, with balanced luffing gear, a grab, a davit gear for ships, oil fuel burners wrought steel, heaters and tubes, high pressure steam piping and soot blowers.

The British Oxygen Co., Ltd., Edmonton, N., and 69, Horseferry Road, Westminster, S.W.1.—The display on this firm's stand (No. 2, B) consists of "Universal" oxy-acetylene injector welding blowpipes in various forms and sizes; "Universal" oxy-acetylene and oxy-coal-gas brazing and lead-burning blow pipes; "Endurance" automatic regulators of different types; high-pressure gas valves for cylinders and gas mains; metal cutting machines for hand operation or electrical power; high duty compressors for all gases and pressures up to 2,000 lb. per sq. in.; air liquefier (college type) and oxygen cylinders. Metal cutting and welding demonstrations are given at frequent intervals each day.

The Chemical Engineering Co. (Manchester), Ltd., 49, Deansgate, Manchester, and 31, High Holborn, London, W.C.1.—The majority of the exhibits of this well-known firm (on Stand 21, F) are of the "Kek" types, comprising centrifugal, grinding and blending mills, automatic crusher and worm feeder, magnetic separator, densimeter, and calorjector. The mill is suitable for grinding, granulating, pulverising or fibring a very wide range of materials, such as chemicals, colours, dyes, paints, cereals and other food products, and is also an efficient emulsifier and colloid mill. Its adaptability is proved by the fact that it will grind and blend in one operation in a liquid or semi-liquid condition anti-fouling paints and compositions, pigments, printing inks, toilet preparations, and similar products. Recently the "Kek" mill has been adapted for powdered fuel-firing furnaces, steam boilers and cement kilns. The densimeter is a combined gauge which indicates the actual density of the boiler water as well as the working level of the water in the boiler. It is approved by the Boiler Insurance Companies and accepted by Lloyd's Register of Shipping. The calorjector induces a supply of hot water from the economiser outlet and mixes with the cool feed supply from the pump. This raises the temperature of the inlet water to the economiser to a sufficient degree to prevent external corrosion of the pipes. The firm are the makers of the Porter Water Softener, which is suitable for either hot or cold process water softening; and they are also manufacturers of oil-eliminating plants.

W. H. Dorman and Co., Ltd., engineers, Foregate, Stafford, and 3, St. Bride's House, Salisbury Square, London, E.C.4.—The specialities exhibited by this firm include a rock drilling plant operated by wave power; a single drill wave-power generator direct-coupled to electric motor; a three-drill wave power generator, driven by a Dorman engine; a self-propelled three-drill wave power plant designed primarily for public works and contractors; a cradle-mounted rock drill on tripod, built from steel forgings. This machine strikes 2,400 blows per minute and has independent and synchronised rotation.

High pressure water from the wave-power transmission line is used for flush to the drill-point. But great interest is centred in the "Flexstel" ball and socket joints, in sizes from $\frac{1}{4}$ in. to 12 in. bore, suitable for high pressures of gas, water, compressed air, steam, petrol, and other liquids. There are, further, the "Flexstel" suction joints for use in the conveyance of gravel, small coal, ashes and grain. There are, too, five Dorman engines and specimens of the "Vislok" safety triple locknut.

The Foster Instrument Co., Letchworth, Herts.—At this firm's stand (4, K) pyrometers of all types and for all temperatures are shown in operation. The "Optical" is of the disappearing filament type, with patent interchangeable "lamp bridge unit." It has an open scale with direct reading in temperature, and, being handy and strong, is suitable for combustion chamber temperatures. The "Radiation" pyrometer is the Foster "fixed focus," and requires no adjustment when in use. The "Thermo-electric," stem type, "base metal," is simple and strong, and the "rare metal" type for research work. The Foster electric resistance thermometers are self-compensating; there is no necessity for the readjustment of the rheostat before reading, nor is there any need for a test point. The "Resilia" indicator has a special construction shielding the instrument from damage due to vibration or rough handling. The Foster Strain-meter, a simple extensometer for direct application to a ship or other structure, shows changes in strain due to launching, change in loading, and is remarkable for its simplicity of construction.

Graphite Products, Ltd., 218, Queen's Road, Battersea, S.W.8.—Stand 8, B, contains a full range of the firm's manufactures, including their "Foliac" flake graphite, claimed to be the best and purest in the world, as attested by analytical and practical records. Other products are paints and lubricants, and lubricators for introducing graphite into cylinders of steam and internal combustion engines.

W. R. Howell and Co., 42, Theobald's Road, London, W.C.1.—On Stand 28, in the gallery, Messrs. Howell have an extensive range of the American Technical Society's publications, comprising civil engineering, applied electricity, steam and gas engineering, automobile engineering and ignition, starting and lighting; modern shop practice, sanitation, heating and ventilation, carpentry and contracting, architectural and mechanical drawing, telephony and telegraphy; also renovation and decoration for painters and decorators, Taylor's system of colour harmony, and other technical publications.

Industrial Waste Eliminators, Ltd., 20, High Holborn, London, W.C.1.—The "Iwel" specialities are the outstanding features of this stand (No. 11, K). Here are the "Iwel" original steam turbine centrifugal separators and extractors (one in operation) for the recovery of grease, oil, fat, wax, etc., from cotton waste, sponge cloths, wiping materials and rags, used in all classes of industrial works, metal turnings, chips, cuttings, borings and small finished metal parts from automatics, also sawdust used under automatics; oil mill residues and materials in general containing oil and other elements susceptible to steam heat and centrifugal force. There is also a washing machine for the cleansing of the oil cloths and overalls, and apparatus and cabinets for the efficient drying of washed articles. The "Iwel" steam turbine combination extractor-washer is specially suitable for work on board ship. The firm have in operation a centrifugal oil filter for the purification of waste and recovered oils, and an "Iwel" cleanser for general cleaning in factories and other large places. The exhibit also includes plant for fat rendering, bone degreasing, the treatment of condemned meat, and producing fats and oils from fish waste and offal and for use in soap works, tallow melting sheds, glue factories, and among provision packers and allied meat industries and oil production trades.

John Kirkaldy, Ltd., 101, Leadenhall Street, London, E.C.—On Stand 2, J, this firm have an attractive display which will appeal to the scientific mind. First one is attracted to a cold chamber, well insulated, connected with a small CO₂ refrigerating machine consisting of compressor, condenser and electric motor. Within the chamber is an evaporator with stove of

brine for holding the temperature of the room when the machine is out of action. In the centre of it is an air-duct with coil and electrically-driven fan for assuring a suitably dry air for the class of goods in storage. In addition to the evaporator, there are shown distillers for providing fresh water for drinking or boiler feed. The CO_2 compressors may be worked with either engines or motors. Included in the display is a compact CO_2 compressor, steam engine, condenser and evaporator, which easily can be fitted wherever needed. A motor-driven iceless ice-cream freezer can be worked in connection with the insulated cabinet shown: the latter stores the cream or hardens it into bricks.

Nobel Industries, Ltd., Nobel House, London, S.W.—The stand (No. 8, G) occupied by Nobels and their affiliated companies is one of the more prominent and attractive. There are explosives for mining, blasting and metal-breaking, including electric detonators. The metal section comprises wire, sheet and strip in copper, brass and other non-ferrous metals. Then there are thermit welding and carbon free metals and bronze and aluminium powders; and the variety of the exhibit is shown in incandescent mantles, soft and colloidised vapour lamps, industrial colloidions and other products manufactured by the subsidiary companies. Also on view are specimens of steel accumulators for all descriptions of application; and it is pointed out that the Edison All-Steel Accumulator may in all cases be employed to replace lead-acid batteries. In connection with the Necol Industrial Colloidions, Ltd., of which Nobels are the proprietors, are being shown specimens of Necol plastic wood, invaluable alike in industry and for home repairs. It can be moulded to any shape and will adhere firmly to timber, metal or other foundations. Immediately on exposure this plastic wood sets hard to a tough, solid, waterproof substance similar in nature to ordinary wood but without any grain. It can be nailed or screwed, and may be cut, polished, or varnished. Another Necol speciality are the glossy enamels for spraying, which have an advantage over ordinary celluloid enamels on account of their increased covering power and greater elasticity and durability. Stoving being unnecessary, fuel and labour costs are economised. Another Nobel constituent company is the Premier Electric Welding Co., Ltd., whose modern types of electric welding plant and equipment are on view. Special attention is drawn to the Multiple Arc D.C. Welding Plant, which is designed with the object of overcoming the difficulty of getting rid of excess voltage without wasting energy. It supplies a current of from 30 to 40 volts, and may be used with any electrode on the market. Nobels are also exhibiting the Alternating Current Arc Welding Plant, single-operator D.C. Machines, and electrodes, including the new Premier high-carbon electrode, 5 per cent. carbon; and demonstrations of welding mild steel with the Premier Standard electrodes are given and the methods of welding cast iron shown. It is worthy of notice that all the Premier electrodes are of the flux-coated type, and do not leave a layer of slag which requires chipping. The metal deposited is, therefore, not likely to be mixed with large quantities of slaggy material, as often is the case with other types of electrodes.

Ransomes, Sims and Jefferies, Ltd., Orwell Works, Ipswich, and 46, Queen Victoria Street, London, E.C.—This firm show on Stand 5, F, a 15 cwt. model of their electric runabout crane. It is constructed on a new principle, will travel, turn, hoist and derrick under its own power, the motive source being a battery of electric accumulators. The wheel system allows the crane to be adapted to moderately uneven ground without detriment to its operation. The dimensions may be imagined when it is stated that the model will pass through a doorway 10 ft. high by 5 ft. 4 in. wide. Orwell industrial trucks, also on view, are fitted with large trailing wheels, and are very useful on rough ground. The C11 model is fitted with an elevating platform, which conduces to economy in loading time. The C6A model is fitted with four-wheel steering gear, which gives a considerably shorter turning radius. There are two sizes of electric motors on the stand, both of them being of compact design and high efficiency.

The Rawplug Co., Ltd., Gloucester House, Cromwell Road, South Kensington, London, S.W.7.—Specimens of the now well known rawplugs and the instruments used to fix them are shown on Stand 8 K. Experience shows that the rawplug may efficiently be used in fixing articles to brick, tile, metal, marble, slate, or any other hard material. The patentees

claim that rawplug fitting occupies one-third of the time of the old slot screw method; and specimens of the new sizes, suitable for coach screws, are shown. One of these will withstand a direct strain of more than three tons weight. The recess screws, the use of which is demonstrated, may be driven into the hardest material without the assistance of a gimlet. In addition to the rawplugs are a variety of aluminium fittings, highly polished, silver-like and untarnishable.

The Relay Automatic Telephone Co., Ltd., Marconi House, Strand, London, W.C.2.—This company show on Stand 20, C, a complete private automatic telephone exchange, comprising switchboard, power board, two sets of 24 volt batteries and telephone instruments—all connected up for use. The switchboard consists of an iron frame containing relay group which can be reversed without putting the service out of action. The relay takes the place of the human operator, and anyone calling up may get in touch within four seconds. The accumulators may be charged from any existing electric light system, either direct or through a motor generator. The instruments are of the most modern type, and a feature of the wiring system is that only two wires are necessary from each telephone to the switchboard. The Relay Company announce that they can arrange for existing branch exchanges to be replaced on a rental basis, and can guarantee a four-second automatic interdepartment service combined with public exchange facilities.

Theo and Co., 6, Hatton Garden and 13, Johnson Street, Liverpool.—On Stand 48, in the gallery, Theo and Co. have on view a "J.F." two-gallon brazing tank which will cope with any outdoor work, even in the strongest wind. Also "Universal" soldering irons and blow lamps with and without pressure pump; a portable tank, with flexible extension for soldering bits, for plumbers' roof-work. Another speciality is the red Theoline shielded storm lamp (for steam lorries and trailers), which is not affected by rough roads. The remaining exhibits by Theo and Co. comprise the "Calo" heater for internal combustion engines; Martin's motor headlamp eclipse for anti-dazzling and light diffusion; the "Just" double-coil piston ring for engines, air compressors and pumps; the "Multiplex" unbreakable spring blades; and the electro-automatic magneto lamps, which are self-generating and will give a bright light for an interminable period.

John Thompson (Wolverhampton), Ltd., Ettinghall, Wolverhampton, and Windsor House, Kingsway, London, W.C.2.—Several models of the productions of this form are on view on Stand 4, F, including the John Thompson boiler, with dished ends and corrugated flues; the John Thompson standard superheater; and the Gourlay end corrugated section. With these are shown models of the John Thompson straight-tube (vertical type) watertube boiler; a vertical boiler, 7 ft. 6 in. high by 3 ft. 3 in. diameter, and a model of the John Thompson mild steel chimney. A model of the Kennicott water-softening plant is also on the stand.

United Water Softeners, Ltd., Imperial House, Kingsway, London, W.C.2.—The stand (15, F) occupied by this firm contains representations of the latest types of "Lassen-Hjort" and "Permutit" water softening, purifying and exhaust steam heating plant, pressure and gravity mechanical filters for town supply and industrial applications; and liquid chlorine sterilising plant for water and sewage purification. There is also a model of the Sharples super-centrifugal processes for the reclamation of used lubricating oils, the treatment of transformer oils for the maintenance of dielectric strength, the dehydration and clarification of crude mineral oils, bottom settlings, and fuel oils. Illustrations are given of the filtration plant, of a capacity of 4,000,000 gallons a day, designed and erected for the Gas Light and Coke Company at Beckton to clarify Thames water for works purposes. As an example of the advance made in water purification the firm show the models and describe the capacities of the Wallace-Tiernan automatic chlorinators for water and sewage sterilisation; the Menzies dual gas system for chlorinating water supplies and sewage; the "Permutit" water softeners for large and small houses and public institutions, and a water testing equipment.

Walker, Crossweller and Co., Danes Inn House, 265, Strand, London, W.C.2.—A series of "Arkon" indicating and recording instruments for boiler house and works control are shown by this firm on Stand 9, H, where also are a number of their gas analysis recorders, comprising the CO_2 recorder, O_2 recorder,

and the combined CO₂ and O₂ recorder, which is the latest development in combustion recorders, being in demand now that the measurement of the oxygen is recognised as necessary to complete control. The gas volume indicators and recorders are of the hydrostatic or liquid-filled type, and are suitable for all gas pressures, from an inch or so of water gas to 22 lb. per sq. in. Another "Arkton" section comprises draught and pressure recorders, vacuum, portable, reversion recorders, vacuum recorders with open scale charts, differential draught recorders and multiple recorders. These, the firm claim, are of particular interest to steam plants, steel works, chemical works, gas works, and wherever else processes need to be controlled. In addition there are a variety of gauges and thermometers for all industrial uses.

Alloy Welding Processes, Ltd., 14, Church Street, Islington, N.—At the stand belonging to this company (No. 13, A) a specially designed welding-plant is shown in operation. The machine consists of a 10 h.p. 2 B.C.R. Gardner engine, capable of a speed of 1,200 r.p.m., connected with a self-stabilising welding dynamo of the drooping characteristic type. This generator, of patent design, represents the latest development in arc welding machines, giving an open circuit voltage of 70, which drops to the pressure required across the welding arc immediately the operation commences, and having an output available which is variable by field control of from 50 to 200 amperes. A steel cover, fitted with four side and two end doors, with a single locking arrangement, encloses the engine and dynamo, and the whole is mounted on a channel steel welded bed plate, to which wheels can be attached. The control and regulating mechanism of the engine and the generator, including the starting handle of the engine, are located at one end of the steel cover, on which also is mounted necessary instruments and switchgear in a water-tight arrangement. This equipment is of British manufacture, and daily demonstrations are given with A.W.P. electrodes, in copper, brass or bronze.

The Auto-Welding and Engineering Co., Ltd., 29A, Portpool Lane, Grays Inn Road, London, E.C.1.—On the stand representing this company (No. 18, C) are shown specimens of "Wanamaker" coated electrodes for electric welding; examples of electric and acetylene welded work; "Portoflex" portable grinding and polishing machines, with flexible shafts in operation; and "Portopool" rotary pumps, whose features are extreme simplicity and accessibility. Of the latter there are only two working parts, which can be opened out for cleansing and replaced within a minute.

The Avamore Pump Co., Ltd., Sicklemill Works, Haslemere, Surrey.—Rotary pumps for all purposes are special features of this company's stand (No. 6, J). There are electric pumping plants, embodying the "Squegee" high-speed positive system, direct coupled to a standard electric motor. Also are to be seen pumping plants suitable for dealing with tar, oil, fuel oil, water, petrol and chemicals; and the "Avamore" enclosed reduction gear, adapted for small power transmissions from 1,000 to 1 to 6 to 1.

The British Arc Welding Co., Ltd., Glengall Road, Millwall, London, E.14.—The exhibits of this firm, grouped on Stand 18, F, comprise tensile and other tests of welded joints; a sample shaft built up by welding and machined subsequent to welding; an experimental tank made for Lloyd's Register of Shipping, embracing combinations of welded and riveted seams, and tested by Lloyd's representatives. There are also defective combustion chambers cut from a marine boiler repaired by the British Arc Welding Co., illustrating a typical welding repair.

British Separators, Ltd., 161, Queen's Road, Peckham, S.E.15.—Two "Vickeen" separators, one arranged for self-contained electric drive, with motor, and the other for belt drive, are shown on this company's stand (No. 10, H). It may be explained that the "Vickeen" separators are manufactured by Messrs. Vickers and their associated companies, and are the only centrifugal machines of this type made in Great Britain. Three main objects are served in the construction of these machines, namely, the continuous separation of two liquids of different specific gravities; the continuous separation of two liquids of different specific gravities and the simultaneous removal from the mixture of fine solids; and the removal of fine solids from a single liquid. The "Vickeen" separators are specially adaptable for the purification of lubricating oil

used in marine engines, Diesel engines, and turbine power plants; for the dehydration and purification of insulating oil from transformers and other oil-insulated electric gear; the purification of cutting and hardening oils; the clarification of varnishes and japans during manufacture and during use in dip tanks; the purification of benzene used in dry-cleaning processes; the separation of wool grease from dirty wool wash liquor and the purification of it; and the separation of oil from tank bottoms.

Carbic, Ltd., 51, Holborn Viaduct, London, E.C.1.—On Stand 9, B, the Carbic company have arranged an attractive display of their specialities. For example, there are Carbic portable oxy-acetylene welding and cutting plants and accessories, including cutters, blowpipes, regulators, welding rods, fluxes, and carbic cakes. There are carbic acetylene generators for steamship and motor vehicle lighting; locomotive headlights and generators, and handlights and flarelights. A model glass generator is employed to demonstrate the method of producing acetylene from carbic cakes, and the methods of cutting and welding are shown. The Carbic Company are also showing Olis King's calculators, including engineer's slide rule models, metric models and sterling models—all of which are capable of solving quickly and accurately everyday commercial calculations.

The Hydrogen, Oxygen and Plant Co., Ltd., 1, Albemarle Street, London, W.1.—The exhibits at this stand (No. 10, B) include oxygen (gaseous and liquid), dissolved acetylene and other gases. There are cylinders of these gases as sold for commercial purposes. Demonstrations of cutting and welding by the oxy-acetylene process are given at intervals. The company are also showing oxygen gas generators for producing the gas by a chemical process generally known as "Oxygenite," which is suitable for use in parts of the world where the special gas is not obtainable in ordinary commercial cylinders. Accessories of the gases, such as blowpipes, pressure-reducing valves, and chemicals for the purification of acetylene, are also on view.

Ozonair, Ltd., 96, Victoria Street, London, S.W.1.—The applications of the Ozonair systems of pure air ventilation and heating, deodorisation, water purification, food preservation, brewing, bleaching, and flourmill air and textile material conditioning are demonstrated on Stand 16, J. A plant dealing with 6,000 cubic feet of air per minute is shown in operation. A combined heating and ventilating unit, capable of dealing with 3,000 cubic feet of floor space, and obviating radiators and heating pipes, is working. A cased fan and motor for large establishments demonstrates its utility. There are also cast-iron sectional boilers with accessory apparatus to the Ozonair systems of heating and ventilating, and a complete range of portable Ozonair apparatus for air purification is a conspicuous feature of the stand.

The Pyrene Co., Ltd., 9, Grosvenor Gardens, London, S.W.1.—Several methods of fire extinction on board ship are exhibited on Stand 44 in the gallery. The "M" type "Conquest" extinguisher, a two-gallon apparatus approved by the Board of Trade, is of special interest. It is of the soda and acid type, and is operated by striking a knob on the top. "Phomene" foam is intended for the extinction of oil fires. This system operates on the principle of blanketing the flames by means of foam consisting of bubbles of CO₂, treated by mixing two chemical solutions which expand into many times their own volume, and when expelled float on the burning surface. The "Phomene" foam hand fire extinguishers are useful in local outbreaks of fire. Every precaution against rust within and without the extinguishers is taken.

Wailles Dove Bitumastic, Ltd., 5, St. Nicholas Buildings, Newcastle-on-Tyne, and 5, East India Avenue, London.—The demonstration given on this stand (No. 17, H) is of a highly practical character. In order to show the efficiency of "bitumastic" the following tests are given: In the acid test bolts coated at one end with "bitumastic" enamels are plunged in acid, which only has effect on the unprotected end. In the below zero test, a refrigerating tank is so arranged as to allow visitors to see a metal plate coated with "bitumastic" undergoing a freezing test; and in order to show the effect of a boiling point test, the same material is immersed in water registering 212° F. Liquid samples and sample plates are to be seen on the stand, and photographs prove the widespread application of this protective agent.

The Late Dr. Edmund Knowles Muspratt

A Great Chemical Leader and Public Man

THE death took place on Saturday, September 1, at his residence, Seaforth Hall, Liverpool, of Dr. Edmund Knowles Muspratt, in his 90th year. Dr. Muspratt was the youngest son of James Muspratt, the founder of the alkali industry in Lancashire, and for years, as a director of the United Alkali Co., was himself a leading figure in the industry. Born in 1833, the year following the great Reform Act, he attended first a school at Worksop, said to be conducted on Pestalozzi's principles, where much attention was paid to science and modern languages.

Education in Germany

In 1850 he went to the University of Giessen, and studied under the great chemist, Justus von Liebig, who became an intimate friend of the family. After a year's preparation he was admitted to the senior laboratory, and mixed with men doing original research. Liebig urged him to specialise in physiological chemistry, and when he accepted a chair at Munich Mr. Muspratt went with him. Later, he resumed his studies in physics and mathematics, and ultimately returned home to take part in the management of his father's chemical works at Liverpool and Widnes. He studied metallurgy in Manchester, in the cellar of the large house in which the Owens College was then lodged, and his knowledge proved so profitable in business that he gave up all idea of following chemistry as a profession. In the 'sixties Weldon's process for the recovery of manganese and Ludwig Mond's process for the extraction of sulphur from alkali waste were introduced in the Muspratt works. In 1890 the businesses of James Muspratt and Sons and Muspratt and Huntley were incorporated with others in the United Alkali Company. He was one of the first directors and for some time vice-chairman of the company, as well as chairman of the British Insulated and Helsby Cables, Ltd. As the result of his scientific knowledge and experience Dr. Muspratt induced his father to make extensive and costly alterations in the works, and thus to add to the prosperity of the company. He attained a sufficiently high position in the trade to be appointed one of the negotiators to help Cobden in making his famous treaty—having, of course, to look after the chemical trade between France and England—and he succeeded in getting the duty on importation into France of English chemicals brought down to 15 per cent., to be reduced to 10 per cent. four years later.

As a result of his studies in Germany, Dr. Muspratt brought to his own business a belief in the urgent necessity of combining scientific research with its industrial application that was rare in business men forty years ago. He was never tired of pointing out that the rapid spread of German chemistry was due, not to the protective laws of that country, but to the system by which chemical manufacturers encouraged research in their own works and laboratories. To emulate that, and to develop British chemistry, Dr. Muspratt not only welcomed trained chemists in his own business, but founded in the University of Liverpool a Laboratory of Physical Chemistry, which has already turned out many distinguished students. It is to his credit that he saw the value of research in times when so many commercial men regarded it with contempt.

Public Work

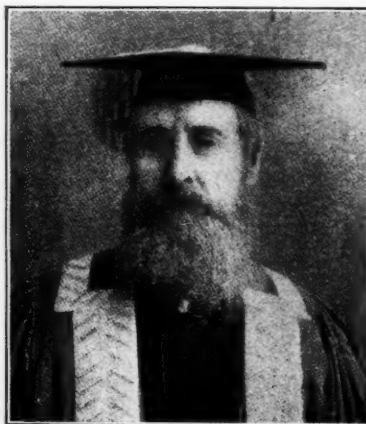
Apart from his association with chemical industry, Dr. Muspratt's life was singularly rich in public, educational, literary, and artistic interests. Born and brought up in the golden age of Liberalism, his sympathies went out freely to every cause for the spread of liberty. On his honeymoon in Italy he was received by Garibaldi, for whose cause he was

enthusiastic, like most Englishmen of the time. In the Civil War in America he went against the prevailing opinion in his own city of Liverpool; but he worked on, and had the joy of seeing his side triumph in the complete suppression of the Southern Rebellion. In home politics he became a supporter of Gladstone and Bright against Palmerston for the extension of the franchise. He also took an active part in the creation of the Financial Reform Association.

An enthusiastic Liberal, Dr. Muspratt twice offered himself as a candidate for Parliament (once for Widnes), but on each occasion was unsuccessful. For some years he was a member of the Liverpool City Council and of the Lancashire County Council, and he also served as chairman of the Liverpool Chamber of Commerce. Perhaps the best work he did for the city was the help he gave in the establishment of the University of Liverpool. He was for some years Pro-Chancellor of the University and president of the Council. His gifts to the University amounted to about £22,000, and as an enlightened educationist he was greatly esteemed by the professors. His services were acknowledged in the conferment on him of the honorary degree of LL.D.

An Appreciation by "T. P."

In an appreciation of Dr. Muspratt Mr. T. P. O'Connor, M.P., writes:—"Though Dr. Muspratt was in his 90th year, he yet seemed to us to belong to a generation farther from us than even his own long tale of life. For he belonged to the period when England had nothing but friendly, even affectionate, and certainly very respectful feelings for Germany. But there are many other things which bring home to one's mind what a different world was that into which Dr. Muspratt was born from that in which he died. Just realise that this man knew Munich when Lola Montez could topple over a throne; that he travelled in Italy when there were passports and Custom houses between a dozen different principalities, when the Austrians still ruled over Lombardy and Venice; that he heard the fall of Sebastopol announced in the theatre at Keswick; that he lived in the house in which he died when it was practically in the country with a little rivulet at the end, where William Ewart Gladstone gathered primroses as a boy, and where railway sidings and warehouses now stand; that he heard Richard Cobden make a speech in favour of international arbitration at a meeting in Frankfort-on-the-Main; that he saw, as a beautiful girl of 12, Helen Dönigges, the woman whose love brought Lassalle, the first great German Socialist leader, to death in a duel; that he knew and partly assisted Cyrus Field in his many attempts, until final success, to connect London and America by cable; that he heard Rachel in Paris, and was the godson of Sheridan Knowles, the once-famous dramatist; that he lived in intimate association with Liebig, the greatest of German chemists, and saw administered to his sick sister for the first time a famous decoction for feeding and soothing a diseased digestion; that as a youth he saw the first great Exhibition in London, and then the first Exposition at Paris in the palmiest days of Louis Napoleon; that he was a youth and even already actively interested in politics before Disraeli became a minister for the first time; that he took a part in negotiating the French Commercial Treaty with Cobden in 1862—but I need not go on. What I have written is sufficient to show that this keen, intellectual, and energetic man, in his long life, saw almost as many changes as though he had been born not in the nineteenth but in the eighteenth century. It requires the record of such a man to realise what a new world in fifty or sixty years has come out of the old."



THE LATE DR. MUSPRATT.

Random Reflexions by a Random Reader.—(IV)

Colloids—Their Cranks and Wanton Wiles

'Tis with our judgments as our watches, none
Go just alike, yet each believes his own.

OUR reflexions have been incontinently 'rupted in our random reading of recent records, among them the Proceedings of the Royal Society, issued July 1st, wherein is much edifying talk of catalysis, of colloids and of solutions, not without bearing upon our present discussion. As we were about to consider the watery protective cap worn by the soap molecules, anxious to

Make use of every friend—and every foe,

we were specially attracted by two communications,* the author of which, Professor H. E. Armstrong, if we mistake not, is the person reverently and aptly styled by Professor Bone, in a recent correspondence, "an old heathen who worships hydrones." One of them is a preachment of Hydrone worship pure and simple.

He that is named Henry would have us believe that there is but one God—perhaps we should rather say, one Goddess, as we recollect reading, in days gone by, an effusive essay, of his writing, strangely entitled "A Dream of Fair Hydrone." Hydrone, the unit molecule, OH_2 , in water, he contends, is the root of all good, indeed of all activity in this world—perhaps in the next also, if the information as to whisky and water telepathed by Raymond be admissible in evidence. It is a dour faith, he preaches, far too simple for the common folk of chemistry, almost sans morals in its simplicity, needing, as it does, merely the application to water and "salts" generally of one or two of the fundamental postulates of organic chemistry.

We should like to call the good Henry over the coals for his introduction of a new term—he so often objects when others take such liberty. Hydrone evidently does not soothe the savage breast of his explosive friend at South Kensington—what will the effect be of Hydronodynamic? Will he regard it as a synonym of ruby water? It may well drive him into an irrepressible frenzy of activated blasphemy.

Still, strange as it seemed to us at first, the term is a haunting one and significant in its suggestiveness: so, anxious to profit even by the words of our foes, we will not rule it out—

Besides, 'tis labour lost: for who would preach
Morals to Armstrong or dull Aston teach?

This, our friend the Lord of Leeds tells us, was writ long ago by the poet Dryden, verily a prescient man! who the Aston referred to may be, we do not know; certainly not he whom we heard at Cambridge, the recognised champion shot of the period, indeed we met one afternoon there specially to imprize his shooting.

The confident cuddlers of chalk eggs may rejoice that the Hydrone heresy is published by the Royal Society, as it is thereby assured of decent burial. No physical chemist would demean himself by studying this Society's publications—at least this is the conclusion we draw from the treatment they receive, year after year, at the hands of the Chemical Society, whose annual reporters systematically disregard their contents. However, such is the breadth of our philosophy, that we shall endeavour to apply even an old heathen's views in discussing the peculiar characteristics of colloids, doubting whether we shall get far though we enjoy such mephisto aid in solving the problems they present; in point of fact, it is because we feel that the subject needs far more intimate treatment than it has yet received that we venture to comment upon it.

Apparently, soap is a material which is not content to lead a simple double life but is *tribious*—a *tribiotite*—the forerunner of a machine combining not merely the boat but the submarine with the aeroplane. It may be submerged, with use of its full engine power; or it may float upon water, partly submerged, with its engine power but partly available; or it may just rest upon the water, with its engines out of

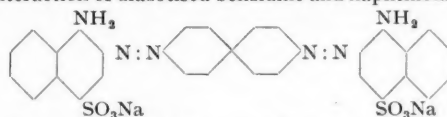
action. In other words, it may be in solution and act as a salt; or it may be present, shall we dare say, as a colloid, in a more or less gelatinous form, in which state it is seemingly but half-salt; or in the solid crystalline state, in which it is inert osmotically and otherwise. These are the conclusions we venture to draw from the Cambridge Report. In the middle state, osmotic and electrical activity are the same whether the condition be that of a mobile fluid or that of a stiff jelly. *It is this middle state we need to understand.*

We do not go too far, we believe, if we assert that the peculiarities of soaps, to which they owe their vogue, are due to their inert, unwetted hydrocarbon body. In a soap film, probably the greater number of the molecules merely rest upon a water surface—in other words, we are using a thinly disguised but improved grease in washing with soaps. The mere weakness of the acids from which they are derived cannot well be the cause of their peculiarities; indeed we are assured by Adam that the parasulphonic acids of hexadecyl- and octadecyl-benzene give soap-like solutions in water.

If that astounding, uncultured person, the physical chemist, had paid the slightest attention to structural organic chemistry, he would have recognised that the soaps do not stand alone. Excepting the hydrocarbons, every homologous series tells the same tale of its tail. The initial term is the most soluble and solubility diminishes as the hydrocarbon influence is increased. The activity resides in the brainy substituent—the negative radicle; but how is the influence exercised? Take hexane, C_6H_{14} , this is practically insoluble and hexylic alcohol but slightly dissolved; yet glucose is almost deliquescent. Cane sugar, as all know, melts in water, yet it has no tendency to crystallise with it, as do so many soluble salts. Why is it we make so little attempt to penetrate these and the many other problems water and solutions present? Why do we hold it so little in reverence? Paraphrasing Carlyle in but a word or two, we may well apply to this mystic fluid what he says of "force" and ask:—

"What is it? God's creation, the religious people answer; it is the Almighty God's! Atheistic science babbles poorly of it, with scientific nomenclatures, experiments and what-nots, as if it were a poor dead thing: but the natural sense of man, in all times, if he will honestly apply his sense, proclaims it to be a living thing—ah! an unspeakable god-like thing."

The apparently half-hearted osmotic behaviour of soap is known to be characteristic of other colloids—notably of Congo Red, the dyestuff (sodium disulphonate) formed by the interaction of diazotised benzidine and naphthionic acid:—



This is very like a whale. A great lumbering body, with but small active fins and an aminic appendage which perhaps is of directive use. Though without any soapiness, this chemical resembles the soaps in that it has a big trunk and a small head—but we shall do well to note that it is a chemical siamese twin, consisting of two like conjoined bodies, each of which has its head; that the body is not slippery is a matter of some interest, of which more anon.

It has the advantage over soap that it blushes and is therefore conspicuous by its presence as well as by its absence: its travels can be watched. Under the influence of electric stress, it will take up its bed and walk as a sentient, independent individual. Thus Bayliss writes: "The property of carrying an electric charge, not as an ion but as undissociated molecules, is shared by Congo Red with matter in mass. In Whetham's boundary apparatus, the dye moves as a whole towards the anode and is therefore negatively charged." From observations with Moore and Roaf's Osmometer, he comes to the conclusion that, through a wide range of concentration, its osmotic influence is practically that of a single neutral molecule, in no way that of a salt, let alone that of a disulphonate. We can only think of the acid radicle as somehow

* "The Origin of Osmotic Effects"—IV. Hydronodynamic change in aqueous solutions.

* "Electrolytic Conduction": Sequel to an attempt (1886) to apply a theory of residual affinity.

tucked away, like Tweedledee bundled up in the umbrella, with only his head out—and perhaps not even that. An even greater secret has to be extracted from this strange molecule, it seems, than from a soap—and the mystery grows when we consider the behaviour of the acid formed from the red salt by the mere addition of a mineral acid. According to Bayliss, this forms a deep blue colloidal solution, with comparatively large particles easily resolved by the ultra microscope: and it has only about one-twentieth of the osmotic influence it should have if present in single (neutral) molecules—so it must be a big lumberly unit like Tweedledee became after he had crawled out of the umbrella and Alice had tied on him all sorts of things—bolsters, blankets, hearth-rugs, table-cloths, dish-covers and coal-scuttles—preparatory to his battle with his brother. Carroll must have had colloid in mind when he wrote the account of the famous tourney. We urge our readers to keep this picture before their eyes. Much of the partial solubility of the salt seems to be sacrificed in the formation of the acid: presumably the acid aggregate is far the more complex. Maybe the osmotic effect is carried by an active agate, gregate or an-aggregate (without soapiness) in equilibrium with an inert associate.

Congo Red is in some degree the analogue of a protein metallic salt; the acid might be expected to exist as an isodynamic intra-compensated ammonio-sulphonate and to be at least as weak as naphthionic acid. We incline to the view that compensation would be brought about not within the simple molecule but through the conjunction of two or more such molecules. Such an "acid" should be red, we think. The fundamental molecule of the blue acid is probably quinonoid, not a bis-azobenzenoid compound:—



We have no means at present of judging how—to what extent—such molecules would 'gregate—but flock together they certainly would. The situation, in fact, is essentially "Looking-Glass'ian," the quest one of ever-increasing interest.

We shall next consider the problem in the light of the "demd Donnan equilibrium," to satisfy Jacques Loeb, who would have us regard this as the one and only chance of colloid salvation.

A New Waterproof Glue

A HIGHLY water-resistant blood albumin glue which can be applied without the use of a hot press has been invented by Mr. A. C. Lindauer of the Forest Products Laboratory, U.S. Forest Service. The development of this glue is the latest and most promising advance made as a result of the long-continued search by the government laboratory for a satisfactory waterproof glue for wood.

The blood glues now used show considerable resistance to moisture, but all require pressing in a press with steam-heated plates, a relatively slow process calling for very expensive equipment. The new glue, which is made by the addition of paraformaldehyde and ammonia to blood albumin, can be used with presses of the same sort used in gluing with animal, vegetable, or casein glues. The cold press blood glue has greater water resistance than any casein or blood glue hitherto tested by the laboratory and has sufficient strength for use in plywood. Plywood test specimens which were placed in the fungus pit of the Forest Products Laboratory under conditions of excessive humidity for a period of one year required a shearing force of 300 lb. to break them apart, and specimens submerged in water for a period of one month proved to be equally strong. The U.S. navy specifications for water-resistant plywood specimens of the same type only require a strength of 180 lb. after soaking for two days. The fungus pit condition endured for even a few months is known to be more severe than a two-day submergence test.

The ease with which the new blood glue can be spread and moulded and its high water resistance may lead to uses parallel to those of the numerous synthetic gums and rubbers of similar composition.

British Chemical Trade with Japan

Official Returns of Imports

IN view of the devastating effects of the earthquake in the principal industrial centres of Japan and the consequent temporary paralysis of trade in that country, some account of Great Britain's business with Japan, so far as the chemical industry is concerned, will doubtless be of interest. The figures relating to the years 1919-20-21 are taken from a Japanese official source. It should be explained that the picul is the equivalent of 133½ lb.

IMPORTS FROM GREAT BRITAIN.

	1919. Piculs.	1920. Piculs.	1921. Piculs.
Petroleum benzene	95	68	—
Paraffin wax	144	146	48
Tanning materials	742	—	169
Gum arabic	1,851	369	775
Shellac	—	—	137
Resin	62	—	—
Other gums and resins	574	745	507
Carbolic acid	25,895	45,922	11,281
Caustic soda, crude	136,007	87,843	2,993
Soda and natural soda	637,946	823,467	890,462
Borate of soda	4,163	7,095	3,080
Cyanide of soda and potash	10,086	5,225	3,083
Sulphate of potash, crude	—	18,833	4,748
Chlorate of potash	3,234	80,019	—
Chloride of ammonium	7,475	18,645	11,826
Sulphate of ammonium, crude	425,172	467,808	197,784
Aniline salt	—	172	—
Dyes, coatings, pigments, etc.	—	182	—
Indigo, artificial	212	381	333
Logwood extract	451	2,244	611
Aniline dyes	919	1,908	657
Other coal tar dyes	14	—	51
Oxide of cobalt	140	200	72
Carbon black	3	42	1,104
Varnishes	1,228	1,384	1,386
Pitch and asphalt	511	108	502
Pulp for paper making	18,150	9,253	18,428
Mineral substances for grinding or polishing	6,303	4,838	2,700
Cryolite	7,250	13,413	259
Ferro manganese	5,977	—	11,776
Ferro chromo and other non-malleable iron alloys	3,847	581	3,857
Platinum	4,817	41,688	746
Aluminium	3,649	18,066	4,764
Copper ingots and slabs	59,225	38,998	11,434
Carbon for electric use	155	560	830

Figures relating to certain materials admitted into Japan during the first three months of the current year are also available, but they represent the total importations, and the proportion, therefore, sent from Great Britain must, to a large extent, be conjectural.

The total amount of nitrate of soda taken into the country was 365,614 piculs, valued at Y2,795,602. Sulphate of ammonia was returned at 268,606 p., value Y2,647,850; caustic soda and soda ash, 529,045 p., value Y1,999,822; coal tar dyes, 2,188,051 kin., value Y3,210,541. Japanese manufacturers have lately begun to make dyestuffs for home consumption, and early this year a combination of the principal sulphur dyemakers sent a large order to Great Britain for carbolic acid for research and experimental purposes, and the Suzuki Shoten of Kobe purchased 1,500 tons of picric acid for use in their dyes factory. During March last dyes amounting to 1,173,461 kin., value Y1,661,262, were imported into Japan in the proportions given below. The yen, roughly, is of the value of 2s.

	Kin.	Yen:
Indigo, natural	5,738	9,381
Indigo, artificial	318,092	533,053
Logwood extract	71,629	41,997
Aniline dyes	771,726	1,063,069
Other coal tar dyes	6,276	13,792

The importations of these articles for the first three months of three years (1920-1-2) are as follows:—

	1920.	1921.	1922.
Indigo, natural	12,482	120,086	261,614
Indigo, artificial	899,405	777,952	78,962
Logwood extract	99,683	577,657	275,357
Aniline dyes	2,163,163	1,693,231	494,560
Other coal tar dyes	24,888	16,036	22,435

Coming to a more recent period, returns published by the Board of Trade show that during June the exports of ammonium compounds to Japan amounted to 4,790 tons (value £78,473) against 2,330 tons in the same month of 1921 (value £35,895), and for the six months ending June 30, 20,392 tons (value £344,400), compared with 50 tons in 1922 (value £650), and 2,430 tons in 1921 (value £37,295).

News of British Residents

At Kasmagaura, about 60 miles north of Tokyo, is located the unofficial British Air Mission attached to the Japanese Navy. The mission is composed of Commander H. G. Brackley, a prominent airman, who is in command. Mrs. Brackley is a daughter of Mr. Robert Mond (Brunner, Mond and Co.), and niece of Sir Alfred Mond. Only recently Mrs. Brackley returned from Japan, and since the news of the earthquake was made known in England she has received a cablegram stating that Major Brackley is safe at Kobe.

Information has come to hand that the European staff of Babcock and Wilcox, engineers, London, who have a branch at Osaka, are safe, but it is feared that their native colleagues have perished. Lever Bros., of Port Sunlight, were up to Thursday without news of their English representative at Tokyo. Among those who escaped was Mr. Kennedy, of the Asiatic Petroleum Co. The European members of the Yokohama staff of Brunner, Mond and Co. are said to be safe, but the native staff are believed to be among the victims.

The heavy list of killed includes the names of Mr. Tebbutt, of the Yokohama staff of the Asiatic Petroleum Co., and Mrs. Tebbutt.

Use of Ozone in Ventilation

In the past few years the question of utilising ozone for purifying air in ventilation of buildings, and also the air of refrigerating plants, has been receiving much attention. In the past the expense of production has been a great drawback to its extensive use. The electrolytic method has been considered standard for several years. Ozone being a rare gas, with active oxidising powers, may be used for the purifying of air used in ventilating public buildings, for the removal of odours and for destroying bacteria. Its use has also been proposed for bleaching textiles and sterilising them. The U.S.A. Department of the Interior, through the Bureau of Mines, is co-operating with the Society of Heating and Ventilating Engineers in four important problems: (1) Methods for quantitative determination of ozone and oxides of nitrogen in ozonised air; (2) Amounts of concentration that will produce the desired results, and the limiting amounts permissible to breathe without harmful effects; (3) Tests of ventilation systems using ozonised air; and (4) Use of ozone in connection with recirculation of air in buildings. The Department of Interior, through the Bureau of Mines, has worked out a method for determining oxides of nitrogen produced by ozone apparatus, by which it was shown that these oxides were not produced in harmful amounts in ventilation apparatus.

A Deviation from Boyle's Law

OXYGEN users often complain that the pressures involved in heavy metal cutting or welding make it impossible for them to use up all the oxygen they pay for as there is always an appreciable residue of gas left in the cylinder. In answer to this complaint the following statement was recently issued by the British Oxygen Company:—"Every cylinder charged with oxygen to 120 atmospheres (our standard pressure) actually contains 7.2 volumes more of the gas than is specified. This is due to the deviation from Boyle's Law which is well known to engineers conversant with gas matters, and may be corroborated by reference to the Report of the Gas Cylinder Research Committee of 1921, page 126. It means that when a cylinder has been emptied to the point where its pressure has been reduced to a little over 100 lbs. per square inch, the full amount of gas charged for has already been used, and the remaining gas in the cylinder is free. As in the majority of cases, in both welding and cutting, oxygen is used at considerably lower pressures than 100 lbs. per square inch, it follows that cylinder users actually get from cylinders more oxygen than they pay for."

Revived Calcium Arsenate Demand

AFTER being dormant all the spring and nearly all the summer, the demand for calcium arsenate (according to *Drug and Chemical Markets*, August 22) in the United States has suddenly revived owing to a recent infestation of pests in the cotton-growing states, which produced a sudden call for insecticides. Paris green was first in demand and as this material became difficult to obtain calls were sent for calcium arsenate. At a time when many jobbers and dealers had given up hope of disposing of their stocks of arsenate this sudden call proved a life-saver to them. Most of the dealers in the South have sold the bulk of their stocks, and emergency lots have been shipped from New York. Several hundred cars have been disposed of during the week. After declining steadily, prices suddenly changed and advanced from 3c. to 4c. per lb. White arsenate has been in good demand for export to Europe and South American countries. Domestic demand is quiet and presents a waiting attitude until calcium arsenate results have been fully digested.

Lectures at Applied Science Exhibition

A NUMBER of lectures have been arranged in connection with the scientific exhibition organised by the British Association at the Central Technical School, Liverpool, which will be opened on Monday, September 10. The lectures during the first week include one by Sir Frank Heath, Secretary of the Department of Scientific and Industrial Research, on "Research and Industry," on Thursday evening next, and one by Professor Smithells on "Flame," on Saturday. In addition to the lectures at the exhibition itself there will be a display showing the progress made in the production of explosives, dyes, intermediates and other chemicals by the leading firms in the country. The engineering exhibits include much relating to stainless steels and other non-corrosive alloys.

Practical Use of a Rare Element

FOR the first time in Great Britain, an installation of neon lighting is now being applied outside the London Coliseum. The apparatus is one of the most interesting evolved since the introduction of electric lighting. Neon lighting is carried out by means of glass tubes from which the air has been exhausted and replaced by a small quantity of pure neon gas at a pressure very much below ordinary atmospheric pressure. This neon gas is rendered incandescent by the passage of a high voltage alternating current, passing between two metal electrodes fitted at the ends of the tube, the colour of the incandescent gas being a peculiarly rich form of flame colour. By means of a rotary converter the direct current supplied from the street mains is converted to the alternating current required.

An Absorption Eccentricity of CO₂

FOR some time the American Bureau of Standards has been working on the absorption of gases and has obtained some very interesting data on the absorption of oxygen in water and of carbon dioxide in sodium carbonate solutions. The result of the latter determination was unexpected and showed that carbon dioxide dissolved less rapidly in normal carbonate solutions than in pure water, in spite of the possibility of the formation of bicarbonates. In order to determine how much of this defect was caused by the viscosity of the absorbent solutions, similar determinations were made of aqueous solutions of sugar having the same viscosity as the sodium carbonate solutions. The effect of the carbonate in decreasing absorption still remained, however.

Japanese Camphor Industry

THE Commercial Counsellor at Tokio reports that during 1922 the camphor export trade showed a marked recovery. The exports of camphor in 1922 amounted to 36,000 piculs, as compared with 14,000 piculs and 10,000 piculs respectively in the two previous years, whilst during the March quarter of this year the exports of this commodity amounted to 14,000 piculs. A large proportion of these exports go to the United States, other large buyers being India and Germany.

From Week to Week

A LARGE TANNERY at Llandilo, Carmarthenshire, took fire last Tuesday and was completely destroyed within half an hour.

AN IMPORTANT EFFORT is to be made in New Zealand, according to the annual report of the Minister of Public Works, to develop the manufacture and export of chemical and metal products with the assistance of hydro-electric power schemes now in progress.

CARBIDE WORKS in Tasmania have been closed for many months owing to the dumping of foreign material, since the embargo on the import of this product was recently lifted. The industry is now to be protected, however, under the Industries Preservation Act.

FOR SELLING CREAM containing boric acid without disclosing the fact to the purchaser, a Willesden milk purveyor was last week fined £50 and costs. The cream contained 0.67 per cent. of acid, whereas the maximum allowed is 0.4 per cent, even when its presence is disclosed.

THE OPINION of one of the United States Trade Commissioners in Germany is that German competition in the dye markets of the world will still be a dominant force to be reckoned with, no matter what the final outcome of the French occupation of the Ruhr may be.

A CONSIDERABLE IMPROVEMENT is reported in certain sections of the pottery trade, particularly in tiles and in decorative and sanitary ware. This is partly due to the increased demand in the building trade, and partly to a recent prolonged strike in the United States.

C. CHRISTOPHERSON AND CO., London, European agents for the "Three Elephant" brand borax, advise that their prices are reduced by £2 per ton as from September 1, to:—Granulated, £23 10s. per ton; powdered, £25 per ton, bags free, delivered carriage paid within the U.K.

THE PROGRAMME of the annual conference of the Textile Institute, to be held this year at Leicester, includes lectures by Professor J. Thorpe, of the Imperial College of Science, on "The application of dyes to fibres and fabrics," and Mr. P. S. King, of Leeds University, on "Artificial Salts."

AN INQUEST opened on Wednesday on the body of Patrick Hanley, a rubber worker employed by W. T. Glover and Co., Trafford Park, Manchester, was adjourned by the Coroner on the ground that death might possibly have been due to some form of poisoning arising out of Hanley's occupation.

AT A MEETING of the newly-established American Institute of Chemistry on September 20, a proposal for incorporation will be submitted. Mr. Horace G. Byers, who has been in England studying the organisation of the British Institute of Chemistry, will present a report on his investigations.

AN INTERNATIONAL PETROLEUM EXPOSITION and Congress is to be held at Tulsa, Oklahoma, United States, from October 9 to 12, 1923. In addition to the displays of petroleum and all equipment and plant, there will be a programme of addresses by prominent representatives of the industry, both domestic and foreign.

WHAT IS DESCRIBED as the first and only manufactory of carbon black from natural gas in the British Empire is about to be established by the Sarnia Oil and Gas Co., who have received permission from the Government of Ontario to manufacture it from the natural gas in the company's oil and gas fields at Sarnia.

SPECIAL CLASSES in paint, varnish and rubber technology and gas supply and gas engineering chemistry are this year included in the curriculum of the Birmingham Municipal Technical (Evening) School. Examinations for the National Certificate of the Institute of Chemistry and the Institute of Gas Engineers have been instituted.

THE CHEMICAL SOCIETY of the Royal Technical College, Salford, which lapsed during the war and was revived last year, has arranged a satisfactory syllabus for the coming session, which opens on September 29. The secretaries are Messrs. J. W. McMyn and A. W. Goring, to whom communications may be addressed at the College.

AN OFFICIAL LIST of dyes has been compiled by the United States Treasury Department for the purposes of assessing dyes imported. The list contains nearly twice as many

colours as a tentative list issued earlier in the year, and contains particulars as to makers, the dyes being classified for dutiable purposes according to strength.

THE DIRECTORS of John Knight, Ltd., soap manufacturers, have presented a gold hunter watch to Mr. Alfred Anscombe, one of their representatives, in recognition of his fifty years' service in the East End of London. The active careers of the last three representatives employed by the company in the same neighbourhood cover no less than 100 years.

THE PAN-PACIFIC SCIENCE CONGRESS concluded its proceedings at Sydney on Monday. It was decided (before anything was known of the disaster to Tokio and Yokohama) to accept the invitation of the Japanese Government to meet in Tokio in 1926 and establish a permanent organisation of scientists and scientific institutions engaged in research.

A LIMITED number of grants-in-aid to junior assistants in chemical works and laboratories in or near London, desirous of extending their knowledge of chemistry, will shortly be allocated by the committee of the Salters' Institute of Industrial Chemistry. Applications should be sent before September 15 to the director of the Institute, Salters' Hall, St. Swithin's Lane, E.C.4.

THE NEWCASTLE GRAPHITE CO.'s works at Hebburn-on-Tyne have been purchased by White's Patent Oil Burning Co., which will centralise there; and the Alby Carbide Co.'s works, at the same place, have been acquired by Universal Postal Frankers, London. A contract for installing oil-burners on the "Stavangerfjord," one of the larger of the Swedish vessels, has been secured by the White Co.

AN EXPLOSION in the chemical works of Duncan F. Lockhart and Co., manufacturing chemists, of Edinburgh, occurred on Friday, August 31, injuring two workmen who were cleaning part of the plant used in the manufacture of ether. The men were using a specially constructed electric torch, and it is thought that, whilst examining a large vessel which had been cleaned, the wires fused and a spark ignited the ether fumes.

THE INSTITUTION OF RUBBER INDUSTRY has issued a preliminary programme of papers to be read during the coming months before the London, Manchester, Birmingham and Edinburgh Sections. These include papers by Major V. Lefebure on "Accelerators," and by Mr. Frederick Kaye on "The Use of Rubber Latex in the Manufacture of Boards, Leather and Linoleum Substitutes and as to the Vulcanisation of these Products," before the London Section.

THE AMERICAN CHEMICAL SOCIETY announces that a trust fund for establishing a fellowship in biological chemistry in the College of Physicians and Surgeons, Columbia University, to be named in honour of the founder, William John Gies, will be presented at the twenty-fifth anniversary of that department on October 1. The committee will also present to Professor Gies an illuminated volume containing letters of appreciation from former students, and from friends in the United States and in Europe.

MR. J. A. S. RITSON, Senior Inspector of Mines in the Cardiff district, has been appointed Professor of Mining at the Leeds University, in succession to Professor Granville Poole, who has left to take up a professorship at Armstrong College, Newcastle-upon-Tyne. Educated at Uppingham and Durham University, Mr. Ritson was for some time personal assistant to Sir William Walker, late Chief Inspector of Mines. He is a testing officer for approving rescue apparatus in mines, and has had considerable practical experience of colliery management.

THE MEMBERS of the Chemical Workers' Union employed at the Limewharf Chemical Works of James Ross and Co. (Limewharf), Ltd., Camelon, near Falkirk, have struck work consequent upon the failure of their executive to arrive at a settlement with the employers. Two weeks ago, following upon the proposal of the employers to effect a reduction of 2s. per week in the case of labourers and 2s. 6d. for shift men, a stoppage of work was decided upon by the men, but after being on strike for some days they agreed to resume at the old rate pending further negotiations. When the reduction notices were subsequently posted, the men by a majority decided to continue working at the new rate of wages until their executive was enabled to adjust matters with the employers. Negotiations have, however, fallen through.

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Abstracts of Complete Specifications

201,119. SEPARATING THE VAPOURS OF VOLATILE LIQUIDS FROM GASES CONTAINING THEM, PROCESS FOR. J. H. Brégeat, 6, Rue St. Georges, Paris. International Convention date, July 21, 1922.

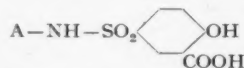
When liquids such as tar oils, cresols, etc., are used as washing liquids to absorb volatile substances from gaseous mixtures, it is known that the absorptive power may be increased by the addition of naphthalene, and the viscosity of the absorbent liquid is decreased. The use of naphthalene may cause difficulties due to its condensation in the pipes of the apparatus, and some naphthalene may be lost during the subsequent separation of the absorbed substance by heating. It is now found that these difficulties may be avoided by the use of hydrogenated derivatives of naphthalene with the washing liquids, particularly tetra-hydronaphthalene (tetralene) and deca-hydronaphthalene (decalene). In an example, benzene is absorbed from coke-oven gases in a mixture of tricresol 60 per cent. and tetralene 40 per cent. An increase in the yield of benzene, etc., of about 8 per cent. is obtained above the yield obtainable by means of the anthracene oils generally used. These hydronaphthalenes are soluble in all proportions in tar oils, phenols, cresols, etc., and the absorbed vapour may be recovered from the solvent by distillation.

201,589. ALLOYS. W. R. Saltrick, "The Acacias," Higher Drive, Purley, Surrey. Application date, March 7, 1922.

The object is to obtain the alloys known as high-speed steels by a direct process without the necessity for the separate production of ferro-tungsten, ferro-chromium, ferro-molybdenum, ferro-vanadium, etc., and the subsequent addition of these to molten steel. In the present invention, reducible ores or compounds of these metals and a reducing agent are heated together so as to produce the required alloy. The reduced metal may be alloyed with molten steel which is present in the furnace, or it may be drawn off to a separate furnace. The reducing agents used are silicon, silicon alloys, or compounds such as ferro-silicon, calcium silicide, aluminium silicide, silicon-aluminium-calcium alloy, boron silicide, magnesium silicide, magnesium-silicon alloys, and other non-carbonaceous silicon-containing reducing agents. These silicon compounds form fusible slags, and any impurity in the alloy is readily eliminated. A very fluid slag may be obtained by using calcium silicide and aluminium silicide, with or without ferro-silicon and/or lime. More powerful reducing agents such as aluminium powder, or aluminium-calcium alloy, may also be added. If carbon is desired in the product, silicon carbide and calcium carbide may also be used. The mixture of ore and reducing agent is briquetted with some lime, and reduced in the electric furnace. The material is gradually added to molten steel in the furnace until the desired alloy is formed, or the ore may be reduced in the furnace and the molten alloy run into another vessel containing steel. Any excess of silicon may be removed by oxidation.

201,610. ANTHRAQUINONE SERIES, NEW DYES OF. British Dyestuffs Corporation, Ltd., Imperial House, Kingsway, London, W.C.2; J. Baddiley, Crumpsall Vale Chemical Works, Blackley, Manchester; and W. W. Tatum, Dalton Works, Huddersfield. Application date, April 28, 1922.

These dyestuffs are obtained when amino derivatives of anthraquinone are condensed with the sulpho-chloride of salicylic acid, the general formula being:—



in which A represents an anthraquinone residue, which may be substituted. The condensation may be effected with or without condensation agents, catalysts, etc., such as sodium acetate. These dyes possess mordant properties, and may be dyed on a chrome mordant, or after-chromed, or dyed by the meta-chrome process. These chromed shades are not greatly different from the unchromed shades, and are very fast to milling and potting. The dyes may also be used for printing on cotton with a mordant, and in dyeing acetate silk. In an

example, a mixture of diamino-anthrurufin, salicylic sulphochloride, anhydrous sodium acetate, and nitrobenzene is heated to 126° C. till no further reaction takes place. The mixture is then steam-distilled with sodium carbonate to remove the nitrobenzene, leaving the sodium salt of the dyestuff in aqueous solution. The dyestuff is isolated by adding hydrochloric acid, and gives reddish blue shades on wool from an acid bath. In another example, a similar dyestuff is obtained from 1:4-diamino-anthraquinone and salicylic sulphochloride.

In another example a mixture of 1:4:5:8-tetra-amino-anthraquinone, salicylic sulphochloride, sodium acetate, copper bronze, and nitrobenzene is heated to 135° C. for three hours, and then isolated as before. It gives bright blue shades on wool.

201,624. CARBAZOLE AND *p*-NITROSOPHENOL AND ITS DERIVATIVES, MANUFACTURE OF CONDENSATION PRODUCTS FROM. W. L. Galbraith, of the Gas Light and Coke Co., Horseferry Road, Westminster, London, S.W.1; W. Lewcock and S. B. Tallantyre, of the Gas Light and Coke Co., Beckton, London, E.16. Application date, May 2, 1922.

Sulphide dyes have been obtained by adding a solution of *p*-nitrosophenol in concentrated sulphuric acid to a solution of carbazole in concentrated sulphuric acid, at a temperature below 30° C., and heating the indophenol thus obtained with alkaline polysulphides. It is now found that the yield and purity of the carbazole indophenols and the sulphide dyes obtained from them may be improved if the concentration is effected at a temperature below -5° C. The purity of the indophenol increases as the temperature of the condensation is reduced, and the quality of the sulphide dye is largely dependent on the quality of the indophenol. The condensation is preferably carried out at -20° C., using a sulphuric acid which remains liquid at that temperature, e.g., 93 per cent. strength. This temperature may be obtained by the evaporation of liquefied ammonia, or by other means. The solid carbazole may be added gradually to a solution of the nitrosophenol in sulphuric acid, or *vice versa*, or a cold solution of the nitrosophenol may be sprayed into a solution of the carbazole. In all cases the mixture is agitated to prevent local over-heating. The mixture is then added to dilute aqueous alkali, such as ammonia, which prevents decomposition of the indophenol and enables the filtration and washing to be effected without loss. An example is given of the production of a condensation product which is completely soluble in alcoholic ammonium sulphide, and in alcohol, to a violet solution, and in concentrated sulphuric acid to a blue solution. This product may be converted to a sulphide dye of full strength if a temperature of -20° C. is employed. If the temperature is higher, the dye is of lower strength.

201,625. CONDENSATION PRODUCTS FROM *n*-SUBSTITUTED CARBAZOLES AND *p*-NITROSOPHENOL AND ITS DERIVATIVES, MANUFACTURE OF. W. L. Galbraith, of the Gas Light and Coke Co., Horseferry Road, Westminster, London, S.W.1; W. Lewcock and S. B. Tallantyre, of the Gas Light and Coke Co., Beckton, London, E.16. Application date, May 2, 1922.

Indophenol dyes have been produced by condensing the imino-substituted derivatives of carbazole, such as *n*-alkyl, *n*-aryl, and *n*-aralkyl carbazoles with *p*-nitrosophenol, its homologues or derivatives. The *n*-substituted carbazole is dissolved in cold sulphuric acid of 66° Bé., and a solution of the nitroso compound in sulphuric acid is added, the temperature being kept below 20° C. The indophenol is then heated with alkaline polysulphides to obtain sulphide dyes. It is now found that the yield and purity of these indophenols and the sulphide dyes obtained from them may be greatly improved if the temperature during the condensation is kept initially at -10° C., and is not allowed to rise above -5° C. The preferred temperature is -20° to -25° C., and this temperature is maintained throughout the condensation. The sulphuric acid employed should remain liquid at this temperature—i.e., a strength of 93 per cent. may be used. The low temperature may be maintained by the evaporation of liquefied ammonia, which may be used to cool a solution which is then passed

through a coil immersed in the reaction mixture, or through a surrounding jacket. The solution of the nitrosophenol is preferably sprayed into a solution of the substituted carbazole, and the mixture is agitated to prevent excessive local heating. The temperature may be more readily controlled if one of the re-agents is added in a sub-divided solid state to a sulphuric acid solution of the other. The condensation product is separated by adding dilute aqueous ammonia, which also prevents decomposition of the indophenol. The subsequent filtration and washing may be effected with less loss than if the condensation product is treated in its acid state. Ammonium sulphate is recovered as a by-product. An example is given of the preparation of an indophenol from *n*-ethyl-carbazole and *p*-nitrosophenol at a temperature of -20°C . The mixture is then poured into aqueous ammonia at 15°C ., the temperature rising to 35°C ., to obtain the indophenol. This product is soluble in pyridine and alcohol giving a violet solution, and in concentrated sulphuric acid giving a greenish-blue solution. A sulphide dye of full strength may be obtained on thionation of this indophenol.

201,664. PRODUCER GAS PLANT. E. E. Bental and G. C. Bingham, Heybridge, Maldon, Essex. Application date, May 10, 1922.

The plant is of the kind in which air and steam in correct proportions are passed upwards through the retort, forming a combustible gas. The grate is formed of two circular grids which are placed face to face, one of them being recessed so that when assembled channels are formed through which water may be passed. Such an arrangement constitutes a flash boiler, and is connected to an automatically controlled water supply, the supply being regulated by a diaphragm pump. This arrangement obviates any delay in starting up the plant, and ensures the proper control of the steam supplied to the producer.

201,712. AZO DYESTUFFS, MANUFACTURE OF. A. G. Bloxam, London. From Chemische Fabrik Griesheim Elektron, Frankfurt-on-Main, Germany. Application date, June 22, 1922.

Azo dyestuffs are obtained by combining a halogen-free diazo compound or a halogen substituted diazo compound with the 4-chloro-3-toluidide, or the 4-bromo-3-toluidide of 2:3-oxynaphthoic acid. These dyestuffs may be produced in substance as well as on the fibre, and are of exceptional fastness to kier-boiling compared with others of similar composition. Several examples are given, using 2:3-oxynaphthoic acid-4-chloro-3-toluidide or 2:3-oxynaphthoic acid-4-bromo-3-toluidide with 4-chloro-3-toluidine, 4-chloro-2-toluidine, 4-bromo-2-toluidine, 5-chloro-toluidine, 4-chloro-2-anisidine, 3-nitro-4-toluidine, or 5-nitro-2-amino-anisol. Reference is directed, in pursuance of Sec. 7, Sub-sec. 4, of the Patents and Designs Acts, 1907 and 1919, to specifications 6,379/1912 and 23,732/1913.

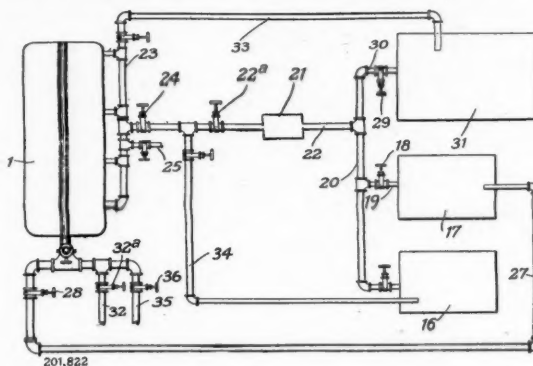
201,786. VAT COLOURING MATTERS, PROCESS FOR PRODUCING. S. Sokal, London. From Kalle & Co., Akt.-Ges., 23, Rheinstrasse, Biebrich-on-Rhine, Germany. Application date, August 24, 1922.

Perylene-3:4:9:10-tetracarboxylic acid is first obtained by melting the peri-naphthindanone or the peri-naphthindione with alkali and then oxidising with an alkaline solution of sodium hypochlorite or a solution of chromic acid or other oxidising agent. The acid is then heated with ammonia or primary aromatic or aliphatic amines which transforms it into very slightly soluble imides, or alkyl, or aryl-imides respectively. These are strongly coloured and possess the properties of vat colouring matters. Several examples are given of the treatment of perylene-tetracarboxylic acid with ammonia, monomethylamine hydrochloride, aniline, *p*-chloro-aniline, α - or β -naphthylamine, α - or β -aminoanthraquinone, *o*-, *m*-, or *p*-phenylenediamine, 1:8-naphthylenediamine, benzidine, etc. These products dye cotton red to blue shades.

201,822. COATING ROTATING FILTERING FRAMES, PROCESS OF. H. A. Vallez, 207, North Mountain Street, Bay City, Mich., U.S.A. Application date, October 26, 1922.

The object is to obtain an even coating on a rotating filtering screen, which then acts as a filtering medium. The filter comprises a horizontal cylindrical shell containing a series of disc filtering units, each of which consists of a pair of circular

screens spaced apart and enclosing a shallow space. All the units are mounted concentrically on a hollow rotating shaft communicating with the spaces within them. No filter cloths are used on these units, but a fine paper pulp or a bleached sulphite pulp is used instead. The pulp is boiled in a tank 16 to disintegrate it and then placed in a tank 17 and mixed with the filtered or unfiltered liquid until it is capable of flowing. The mixture then passes through a pipe 20 and



pump 21 to a pipe line 23 and thence to the filter 1. The pulp is deposited on the filter screens, some of it passing through at first, the rotation of the screens ensuring an even deposit. The valve 28 is then closed and the valve 29 opened, so that liquid to be filtered passes from the tank 31 through the pump 21 to the filter. The filtrate passes out through the hollow shaft and pipe 32 to a tank. When the filter requires cleaning, the valves 32a, 24, 22a, 29 are closed and liquid in the filter is forced back to the supply tank through pipe 33. Water is introduced through the pipe 25 and passes through the filter to the pipe 35. The valve 36 is then closed, the filter is half-filled with water, and steam and compressed air are admitted to heat and agitate the water. A spray is then directed from perforated pipes against the filter cake on the screens, to remove it, and the mixture is then returned through the pipe 34 to the washer 16 for use again.

NOTE.—Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention:—183,823 (L. Kern), relating to a method of obtaining mineral oils from bituminous rocks, see Vol. VII, p. 504; 195,061 (T. P. L. Petit), relating to a process for removing hydrogen sulphide from gases, see Vol. VIII, p. 576.

International Specifications not yet Accepted

200,070. MANURES. Soc. E. Coppée et Cie, 103, Boulevard de Waterloo, Brussels. International Convention date, June 29, 1922.

Distillers' wash or other organic matter is treated with sulphuric acid or acid salt to neutralise alkalies and decompose nitrogenous matter. Peat, sawdust, or rice straw is then added, and the material is applied to wire gauze carried by heated drums, or in an oven or furnace at 280°C . After drying, the material is cooled and removed. Any volatile products are recovered by absorption in sulphuric acid in washers, and the acid may be used for treating fresh raw material.

200,074. ALLOYS. L. Duparc, Ecole de Chimie, Geneva. International Convention date, June 27, 1922.

An alloy of platinum with 1-5 per cent. of tantalum is made by melting compressed pastilles of tantalum in melted platinum, or by melting compressed pastilles of tantalum mixed with spongy platinum, in an electric furnace. The alloy is hard and malleable, and is resistant to acids and fused potassium bisulphate.

200,087. ACETYLENE POLYMERISATION PRODUCTS. Elektrizitäts-werk Lonza, 72, Aeschenvorstadt, Basle, Switzerland. International Convention date, June 30, 1922.

Solid polymerisation products of acetylene such as "cuprene" are obtained by bringing acetylene into contact with a copper catalyst at a raised temperature. If 5-15 per

cent. of nitrogen is added to the acetylene, losses due to coking are reduced.

LATEST NOTIFICATIONS.

- 202,970. Process of and apparatus for the reduction of meta oxides with continuous regeneration of the reducing-gas employed. Constant, G., and Bruzac, A. August 22, 1922.
 202,975. Production of aromatic sulphonic acids. Rheinische Kampfer Fabrik Ges. August 23, 1922.
 202,984. Process of producing fast tints on the fibre. Soc. of Chemical Industry in Basle. August 23, 1922.
 202,985. Process of manufacturing durable compounds containing active oxygen. Noll, Dr. F. August 28, 1922.
 202,994. Process and apparatus for the continuous analysis of mixed gases. Piccard, A. August 22, 1922.
 202,997. Process for the manufacture of viscous or resinous products. Chemische Fabrik auf Actien vorm. E. Schering. August 24, 1922.

Specifications Accepted, with Date of Application

- 177,493 and 191,085. Vulcanising rubber, Processes for—and products obtained thereby. S. M. Cadwell. March 25, 1921, and February 15, 1922. 191,085 addition to 177,493.
 181,376. Enriching gas mixtures with respect to certain constituents, Process and apparatus for. T. Goldschmidt Akt.-Ges. June 9, 1921.
 182,134. Calcium cyanamide, Process for the economic employment of the residues resulting from the decomposition of—by acid. Soc. d'Etudes Chimiques pour l'Industrie. June 25, 1921.
 189,782. Indigoid dyestuffs, Manufacture of. Soc. pour l'Industrie Chimique à Bale. November 30, 1921.
 190,157. Solid substances in a finely divided state, Process for the production of—by volatilisation. T. Goldschmidt Akt.-Ges., L. Schertel, and W. Luty. December 8, 1921.
 195,077. Ferric hydroxide, Process for the manufacture of. Waterloo Chemical Works, Ltd. March 15, 1922.
 202,333. Bituminous or cellulose containing material, Process for the dry distillation of. I. Mosicki. February 16, 1922.
 202,382. Retorts and the like. H. G. C. Fairweather. (*Air Reduction Co., Inc.*) May 15, 1922.
 202,383. Alkali cyanides, Process of manufacture. H. G. C. Fairweather. (*Air Reduction Co., Inc.*) May 15, 1922.
 202,401. Water soluble oil, Process of producing. H. W. Hutton. May 18, 1922.
 202,422. Hydrocarbons, Process for refining. Plauson's (Parent Co.), Ltd. (*H. Plauson.*) May 22, 1922.
 202,532. Antimony, Process for directly obtaining pure. A. Germot. September 8, 1922.

Applications for Patents

- Badische Anilin- & Soda-Fabrik and Johnson, J. Y. Manufacture of oxygenated organic compounds. 21,733. August 28.
 Bruzac, A., and Constant, G. Reduction of metal oxides. 21,927. August 30.
 De Wendel et Cie, Les Petits Fils de F. Liquid air or liquid oxygen explosives. 21,682. August 27. (France, September 22, 1922).
 Garbe, J. B. Treatment of pitch, etc., for briquettes, etc. 21,655. August 27.
 Griffiths, M. E., Nobel's Explosive Co., Ltd. and Picton, N. Varnishes, etc. 21,933. August 30.
 Holley, E. Application of lamp black to metal moulds. 22,068. September 1. (United States, September 27, 1922).
 Hydrocarbons, Ltd. and Porter, J. A. Cheston. Apparatus for catalytic treatment of hydrocarbons. 22,081. September 1.
 Morgan Crucible Co., Ltd. Resistances for electric heating. 22,024. August 31.
 Pelligrini, G. and Poma, G. Manufacture of metaphenylenediamine. 21,659. August 27.
 Pelligrini, G. and Poma, G. Preparation of alphanaphthylamine. 21,660. August 27.
 Pico, L. Boggiano. Destructive fermentation of organic residues. 21,916. August 30. (Italy, August 30, 1922).
 Plaulen, R. and Rascher, H. Production of white lead. 22,004. August 31. (Germany, September 2, 1922).
 Scottish Dyes, Ltd. and Thomas, J. Production of anthraquinone sulphonic acids. 22,029. August 31.
 Soc. d'Etudes Chimiques pour l'Industrie. Manufacture of manures. 22,076. September 1. (Germany, September 8, 1922).

Patents Court Cases

Application has been made under Section 24 of the Patents and Designs Acts, 1907 and 1919, for the following patent to be endorsed "Licence of Right": 135,141 (C. N. Rüber) relating to a process for the purification of alkaline chloride solutions which are to be electrolysed.

Application has also been made under Section 20 for the restoration of the following patents, which had lapsed: 7560/1914 (K. Tarassof), relating to a process for the manu-

facture of hard compositions from aldehydes and their derivatives and phenols with tar, turpentine oil, and like substances; 102,751 (K. Tarassof), relating to the production of hard compositions from formaldehyde and phenols with carbohydrates, albuminous materials and tannins; 104,887 (K. Tarassof and P. Shestakoff), relating to a process for obtaining hard products of condensation of phenols and formaldehyde.

Opposition to all these applications may be made by interested parties.

Boiler Feed Water Treatment

A New Publication by Brunner, Mond and Co.

BRUNNER, MOND AND CO., LTD., have just issued a new book, *Water Treatment*, which, whilst intended primarily for engineers and those in charge of steam boiler plant, contains such a clear and lucid account of the whole principles of water softening that technical chemists would no doubt be glad to possess a copy. Since we understand the book may be obtained free of charge by writing to the above firm at their head office, Northwich, Cheshire, any readers interested in the subject may be advised to avail themselves of this offer without delay. Most chemists are already acquainted with the general theoretical principles underlying the hardness and treatment of boiler feed water, although as a rule even these are none too clearly expressed in the average text-book on chemistry. A detailed study of this volume produced by Brunner, Mond and Co.'s Research Departments will undoubtedly spread much needed light on the whole subject. In the first place, it is strongly recommended that all softening plants should be of sufficient capacity to allow of a thorough settling of the precipitate, and much trouble has been caused in the past by purchasing plants with too small a cubical content. The book gives some excellent hints both in the choice and in the use of the lime-soda ash plant; incidentally, it is recommended to use a little alumino-ferric to get rid of the last traces of magnesia, on the same lines as carried out in oil separation. The removal of magnesia is often difficult, and many are inclined to favour for this purpose, although opinions differ, the use of a lime-water type of plant as opposed to a lime-cream plant. Other interesting sections of the book are those dealing with the use of caustic soda in special cases when free CO₂ is present in the water, and the treatment of acid water, whether due to mineral acid, or "peaty" acids from decomposing organic vegetable matter, as in moorland waters. The necessity of increased attention to this important subject is shown by the fact that the average hardness of the boiler feed water of the United Kingdom is about 12 grains per gallon, and, according to the experts, the chemical industry is no better than the average.

"The Chemistry of Leather Manufacture"

WITH respect to the monograph on *The Chemistry of Leather Manufacture*, a review of which was published in THE CHEMICAL AGE of July 28, it may be of interest to state that this is one of a series of monographs published under the auspices of the American Chemical Society. There are two series for which the Society is responsible—the Scientific Series, of which Dr. W. A. Noyes is editor, and the Technological Series, for which Dr. H. E. Howe is responsible. Each editor has a board that assists in the choice of titles and authors, reviews tentative outlines previous to the writing of the book, and assists in criticising the final manuscript. The Society hopes to encourage by this the publication of monographs covering topics that have been somewhat neglected, and believes that in so doing the literature can be made more complete and further useful information placed in the hands of the workers, while sometimes the discussions will of themselves stimulate further original research and inquiry.

A Novel Dyeing Test

THE United States Army is co-operating with a special committee of the American Chemical Society to determine the most suitable dye to produce the "olive drab" of the military uniform. Special cloths will be dyed with different dyes and thoroughly tested out in a tropical climate. Vat dyes are the most suitable, but they are expensive, and the object of the tests is to determine whether mineral, alizarine or sulphur colours maintain a uniform colour under the trying conditions of tropical service.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

London, September 6, 1923.

AN improvement in the demand for chemical products has been noticeable and a fair amount of business has been put through. Several products remain in short supply, and forward prices are on the whole firmer.

General Chemicals

ACETONE remains in good demand with inadequate supplies. ACID ACETIC.—In slightly better supply without change in price.

ACID BORIC.—English makers advise a reduction.

ACID CITRIC is receiving fair inquiry, although price shows no improvement.

ACID LACTIC is scarce and price has an upward tendency.

ACID ONALIC is in poor demand and price inclined to be easier. ARSENIC is in better request and price very firm.

BARIUM CHLORIDE is in slightly better supply, although price keeps firm.

BORAX.—English makers advise a reduction.

CREAM OF TARTAR is in fair request and no change in price is recorded.

FORMALDEHYDE remains scarce on the spot, most of the business transacted is for forward.

LEAD ACETATE.—Rather slow in demand, but price is very firm.

LIME ACETATE.—Price continues firm and is likely to advance. LITHOPONE is in good request.

CARBONATE AND CAUSTIC POTASH have received fair inquiry. YELLOW PRUSSIAN OF POTASH.—A fair amount of business, has been booked and price appears to be steady.

SODIUM ACETATE remains scarce, price firm.

SODIUM NITRITE continues in short supply and the forward position is firm.

PRUSSIAN OF SODA.—There has only been a limited demand and price shows no change.

SODIUM SULPHIDE has been in request for home and export.

ZINC SALTS.—Price is unchanged with fair business passing.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID.—In steady demand. Price unchanged. ACID LACTIC.—Firm.

CHLORAL HYDRATE.—Stocks are low and higher prices are asked in some quarters.

COCAINE has again advanced.

EUCALYPTUS OIL.—Firm, with tendency towards higher prices.

HYDROQUINONE.—The raw material is very firm, and makers would consequently not be able to replace stocks at the present level.

MILK SUGAR.—Unchanged at present, with the prospect of higher prices ruling during the winter months.

PHENACETIN.—Slow; some holders of stocks seem inclined to cut prices slightly.

SODA SALICYLATE in good demand, higher prices being readily paid for the best brands.

VANILLIN.—Unchanged.

Coal Tar Intermediates

Business during the past week has been quite steady, but with nothing of outstanding interest to report.

ALPHA NAPHTHOL has been a small home trade at recent values.

ALPHA NAPHTHYLAMINE continues quite firm, but without any heavy line to report.

ANILINE OIL continues to demand a small premium for spot delivery, and is a very firm market.

ANILINE SALT.—Some small export inquiries are reported.

BENZALDEHYDE has been of some slight interest on export account.

BENZIDINE BASE.—Both home and export buyers have been interested, and the price is very firm.

BETA NAPHTHOL has been a small trade at last quoted price. DIMETHYLANILINE.—Some fair business is reported on home account.

DINITROCHLOROBENZOL is without special feature in the export market, but some orders have been placed in home trade. "H" ACID is firm with a fair business passing.

PARANITRANILINE.—Home trade inquiries are reported.

Coal Tar Products

The general demand for Coal Tar Products has fallen away somewhat, and there is little new business passing.

90% BENZOL is plentiful, and is worth about 1s. 4d. to 1s. 4½d. per gallon on rails.

PURE BENZOL is worth 1s. 7d. to 1s. 9d. per gallon on rails.

CREOSOTE OIL is quietly steady, at about 8½d. to 8¾d. per gallon on rails in the north, while the price in the south is 9½d. to 9¾d. per gallon.

CRESYLIC ACID is in poor demand, and is worth about 1s. 10d. per gallon for the pale quality 97/99%, while the dark quality 95/97% is worth about 1s. 7d. to 1s. 8d. per gallon.

SOLVENT NAPHTHA is weak, and is worth about 1s. 2d. per gallon on rails.

HEAVY NAPHTHA is quoted at 1s. 4d. to 1s. 5d. per gallon on rails.

NAPHTHALENES are plentiful, and the lower qualities are worth from £6 5s. to £7 per ton, while 74/76 and 76/78 melting points are worth about £8 to £9 per ton.

PITCH.—The demand remains slow, and prices are somewhat easier. To-day's quotations are approximately—140s. to 145s. f.o.b. London; 135s. to 140s. f.o.b. East and West Coast ports.

Sulphate of Ammonia

There are no new features to report.

[Current Market Prices on following pages.]

Nitrate of Soda Market

In their monthly report on nitrate of soda, Henry Bath and Son state that deliveries from European ports during August amounted to about 52,000 tons, compared with 30,000 tons a year ago. Throughout the month the market has ruled quiet and inactive, with business in consuming centres at a standstill. A few transactions are reported in arrived parcels by liners at from £11 7s. 6d. to £11 6s. per ton, c.i.f., while September and November liner shipment is reported sold at £11 7s. 6d. and £11 10s., c.i.f., respectively. The c.i.f. market has remained under the influence of falling nitrate freights, which were offered at 17s., and possibly lower for September loading, but during the last day or so the pressure of tonnage on the market has been less pronounced. In the present uncertain condition of international politics and the resultant disturbance of Continental exchanges there is a complete lack of interest in nitrate for forward delivery. Sales by the Producers' Association during the past month amount to 12,000 tons. Only a few thousand tons of second half of November delivery remain in the hands of the Association for sale at 20s. 7d. per quintal. German nitrogen prices are now based on the value of rye in the proportion of 100 kilos sulphate of ammonia to 140 kilos rye.

Current Market Prices

General Chemicals

	Per	£	s.	d.	£	s.	d.	
Acetic anhydride, 90-95%.....	lb.	0	1	4	to	0	1	5
Acetone oil.....	ton	80	0	0	to	85	0	0
Acetone, pure.....	ton	130	0	0	to	135	0	0
Acid, Acetic, glacial, 99-100%.....	ton	71	0	0	to	72	0	0
Acetic, 80% pure.....	ton	50	0	0	to	51	0	0
Acetic, 40% pure.....	ton	25	0	0	to	26	0	0
Arsenic, liquid, 2000 s.g.....	ton	85	0	0	to	88	0	0
Boric, commercial.....	ton	48	0	0	to	52	0	0
Carbolic, cryst. 39-40%.....	lb.	0	1	1½	to	0	1	2½
Citric.....	lb.	0	1	6½	to	0	1	7
Formic, 80%.....	ton	50	0	0	to	51	0	0
Hydrofluoric.....	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.....	ton	38	0	0	to	39	0	0
Lactic, 60 vol.....	ton	43	0	0	to	45	0	0
Nitric, 80 Tw.....	ton	26	0	0	to	27	0	0
Oxalic.....	lb.	0	0	6½	to	0	0	6½
Phosphoric, 1.5.....	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.....	lb.	0	5	9	to	0	6	0
Salicylic, technical.....	lb.	0	1	9	to	0	2	0
Sulphuric, 92-93%.....	ton	6	0	0	to	7	0	0
Tannic, commercial.....	lb.	0	2	3	to	0	2	9
Tartaric.....	lb.	0	1	3½	to	0	1	4
Alum, lump.....	ton	12	10	0	to	13	0	0
Chrome.....	ton	28	0	0	to	29	0	0
Alumino ferric.....	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14-15%.....	ton	8	10	0	to	9	0	0
Sulphate, 17-18%.....	ton	10	10	0	to	11	0	0
Ammonia, anhydrous.....	lb.	0	1	6	to	0	1	8
880.....	ton	32	0	0	to	34	0	0
920.....	ton	22	0	0	to	24	0	0
Carbonate.....	ton	32	15	0	to	—	—	—
Chloride.....	ton	50	0	0	to	55	0	0
Muriate (galvanisers).....	ton	35	0	0	to	37	10	0
Nitrate (pure).....	ton	35	0	0	to	40	0	0
Phosphate.....	ton	65	0	0	to	68	0	0
Sulphocyanide, commercial 90% lb.....	0	1	1	0	to	0	1	3
Amyl acetate, technical.....	ton	280	0	0	to	300	0	0
Arsenic, white powdered.....	ton	73	0	0	to	75	0	0
Barium, carbonate, Witherite.....	ton	5	0	0	to	6	0	0
Carbonate, Precip.....	ton	15	0	0	to	16	0	0
Chlorate.....	ton	65	0	0	to	70	0	0
Chloride.....	ton	15	10	0	to	16	0	0
Nitrate.....	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry.....	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp.....	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%.....	lb.	0	0	11	to	0	1	0
Bleaching powder, 35-37%.....	ton	10	7	6	to	10	17	6
Borax crystals, commercial.....	ton	25	0	0	to	—	—	—
Calcium acetate, Brown.....	ton	13	0	0	to	14	0	0
Grey.....	ton	22	0	0	to	23	0	0
Carbide.....	ton	16	0	0	to	17	0	0
Chloride.....	ton	5	15	0	to	6	0	0
Carbon bisulphide.....	ton	35	0	0	to	40	0	0
Casein technical.....	ton	100	0	0	to	105	0	0
Cerium oxalate.....	lb.	0	3	0	to	0	3	6
Chromium acetate.....	lb.	0	1	1	to	0	1	3
Cobalt acetate.....	lb.	0	6	0	to	0	6	6
Oxide, black.....	lb.	0	9	6	to	0	10	0
Copper chloride.....	lb.	0	1	1	to	0	1	2
Sulphate.....	ton	26	0	0	to	27	0	0
Cream Tartar, 98-100%.....	ton	92	0	0	to	93	10	0
Epsom salts (see Magnesium sulphate)								
Formaldehyde, 40% vol.....	ton	85	0	0	to	87	0	0
Formusol (Rongalite).....	lb	0	2	1	to	0	2	2
Glauber salts, commercial.....	ton	4	0	0	to	4	10	0
Glycerin crude.....	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.....	gal	0	2	0	to	0	2	1
Iron perchloride.....	ton	18	0	0	to	20	0	0
Sulphate (Copperas).....	ton	3	10	0	to	4	0	0
Lead acetate, white.....	ton	43	0	0	to	45	0	0
Carbonate (White Lead).....	ton	43	0	0	to	45	0	0
Nitrate.....	ton	44	10	0	to	45	0	0
Litharge.....	ton	37	0	0	to	39	0	0
Lithophone, 30%.....	ton	22	10	0	to	23	0	0
Magnesium chloride.....	ton	3	10	0	to	3	15	0
Carbonate, light.....	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial).....	ton	5	15	0	to	6	0	0
Sulphate (Druggists').....	ton	8	0	0	to	9	0	0
Manganese Borate, commercial.....	ton	65	0	0	to	75	0	0
Sulphate.....	ton	45	0	0	to	50	0	0
Methyl acetone.....	ton	82	0	0	to	85	0	0
Alcohol, 1% acetone.....	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt.....	ton	37	0	0	to	38	0	0
Ammonium sulphate, double salt ton	37	0	0	0	to	38	0	0

	Per	£	s.	d.	£	s.	d.	
Potash, Caustic.....	ton	30	0	0	to	32	0	0
Potassium bichromate.....	lb.	0	0	5½	to	0	0	6
Carbonate, 90%.....	ton	30	0	0	to	31	0	0
Chloride, 80%.....	ton	9	0	0	to	10	0	0
Chlorate.....	lb.	0	0	3½	to	—	—	—
Metabisulphite, 50-52%.....	ton	65	0	0	to	70	0	0
Nitrate, refined.....	ton	38	0	0	to	40	0	0
Permanganate.....	lb.	0	0	10	to	0	0	10½
Prussiate, red.....	lb.	0	3	0	to	0	3	2
Prussiate, yellow.....	lb.	0	1	1	to	0	1	1½
Sulphate, 90%.....	ton	10	0	0	to	10	10	0
Salammoniac, firsts.....	cwt.	3	3	0	to	—	—	—
Seconds.....	cwt.	3	0	0	to	—	—	—
Sodium acetate.....	ton	25	0	0	to	25	10	0
Arsenate, 45%.....	ton	45	0	0	to	48	0	0
Bicarbonate.....	ton	10	10	0	to	11	0	0
Bichromate.....	lb.	0	0	4½	to	0	0	4½
Bisulphite, 60-62%.....	ton	21	0	0	to	23	0	0
Chlorate.....	lb.	0	0	3	to	0	0	3½
Caustic, 70%.....	ton	17	10	0	to	18	0	0
Caustic, 76%.....	ton	18	10	0	to	19	0	0
Hydrosulphite, powder.....	lb.	0	1	5	to	0	1	6
Hypo sulphite, commercial.....	ton	10	10	0	to	11	0	0
Nitrite, 96-98%.....	ton	27	10	0	to	28	0	0
Phosphate, crystal.....	ton	16	0	0	to	16	10	0
Perborate.....	lb.	0	1	0	to	0	1	1
Prussiate.....	lb.	0	0	6½	to	0	0	6½
Sulphide, crystals.....	ton	8	10	0	to	9	0	0
Sulphide, solid, 60-62 %.....	ton	14	10	0	to	15	10	0
Sulphite, cryst.....	ton	11	10	0	to	12	0	0
Strontium carbonate.....	ton	50	0	0	to	55	0	0
Nitrate.....	ton	50	0	0	to	55	0	0
Sulphate, white.....	ton	6	10	0	to	7	10	0
Sulphur chloride.....	ton	25	0	0	to	27	10	0
Flowers.....	ton	11	0	0	to	11	10	0
Roll.....	ton	9	15	0	to	10	10	0
Tartar emetic.....	lb.	0	1	2	to	0	1	3
Tin perchloride, 33%.....	lb.	0	1	1	to	0	1	2
Perchloride, solid.....	lb.	0	1	3	to	0	1	4
Protochloride (tin crystals).....	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.....	ton	20	0	0	to	21	0	0
Chloride, solid, 96-98%.....	ton	25	0	0	to	30	0	0
Oxide, 99%.....	ton	42	0	0	to	45	0	0
Dust, 90%.....	ton	50	0	0	to	55	0	0
Sulphate.....	ton	15	0	0	to	16	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid.....	lb.	0	3	0	to	0	3	3
Acetanilid.....	lb.	0	1	6	to	0	1	9
Acid, Gallic, pure.....	lb.	0	3	0	to	0	3	3
Lactic, 1.21.....	lb.	0	2	3	to	0	2	6
Salicylic, B.P.....	lb.	0	2	1	to	0	2	3
Tannic, lewiss.....	lb.	0	3	2	to	0	3	4
Amidol.....	lb.	0	7	9	to	0	8	3
Amidopyrin.....	lb.	0	12	0	to	0	12	6
Ammon ichthosulphonate.....	lb.	0	1	10	to	0	2	0
Barbitone.....	lb.	0	17	9	to	0	18	9
Beta naphthol resublimed.....	lb.	0	1	9	to	0	2	0
Bromide of ammonia.....	lb.	0	0	7	to	0	0	7½
Potash.....	lb.	0	0	6	to	0	0	6½
Soda.....	lb.	0	0	7	to	0	0	7½
Caffeine, pure.....	lb.	0	10	9	to	0	11	0
Calcium glycerophosphate.....	lb.	0	5	9	to	0	6	0
Lactate.....	lb.	0	1	9	to	0	1	10
Calomel.....	lb.	0	4	0	to	0	4	3
Chloral hydrate.....	lb.	0	4	0	to	0	4	3
Cocaine alkaloid.....	oz.	0	19	6	to	0	1	0
Hydrochloride.....	oz.	0	16	6	to	0	17	0
Corrosive sublimate.....	lb.	0	3	8	to	0	3	10
Eucalyptus oil, B.P. (70-75% eucalyptol).....	lb.	0	2	4	to	0	2	6
B.P. (75-80% eucalyptol).....	lb.	0	2	5	to	0	2	8
Guaiacol carbonate.....	lb.	0	8	6	to	0	8	9
Liquid.....	lb.	0	8	9	to	0	9	3
Pure crystals.....	lb.	0	9	3	to	0	9	9
Hexamine.....	lb.	0	3	8	to	0	3	10
Hydroquinone.....	lb.	0	3	3	to	0	3	6
Lanoline anhydrous.....	lb.	0	0	7	to	0	0	7½
Lecithin ex ovo.....	lb.	0	17	6	to	0	19	0
Lithi carbonate.....	lb.	0	9	6	to	0	10	0
Methyl salicylate.....	lb.	0	2	3	to	0	2	6
Metol.....	lb.	0	9	0	to	0	10	0
Milk sugar.....	cwt.	4	2	6	to	4	5	0
Paraldehyde.....	lb.	0	1	5	to	0	1	7½
Phenacetin.....	lb.	0	6	0	to	0	6	3
Phenazone.....	lb.	0	7	0	to	0	7	3
Phenolphthalein.....	lb.	0	6	9	to	0	7	0
Potassium sulpho guaiacolate.....	lb.	0	5	0	to	0	5	3
Quinine sulphate, B.P.....	oz.	0	2	3	to	—	—	—

	Per	£	s.	d.	£	s.	d.
Resorcin, medicinal.....lb.	0	5	6	to	0	5	9
Salicylate of soda powder.....lb.	0	2	6	to	0	2	9
Crystals.....lb.	0	2	6	to	0	2	8
Salol.....lb.	0	3	0	to	0	3	3
Soda Benzoate.....lb.	0	2	4	to	0	2	6
Sulphonal.....lb.	0	14	0	to	0	14	6
Terpene hydrate.....lb.	0	1	9	to	0	2	0
Theobromine, pure.....lb.	0	10	6	to	0	11	0
Soda salicylate.....lb.	0	7	6	to	0	7	9
Vanillin.....lb.	1	3	0	to	1	4	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude.....lb.	0	2	0	to	0	2	3
Refined.....lb.	0	2	6	to	0	2	9
Alphanaphthylamine.....lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra.....lb.	0	0	9	to	0	0	9½
Salts.....lb.	0	0	9½	to	0	0	10
Anthracene, 40-50%.....unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine).....lb.	0	2	6	to	0	2	9
Benzidine, base.....lb.	0	4	9	to	0	5	0
Sulphate.....lb.	0	3	9	to	0	4	0
Benzoic acid.....lb.	0	2	0	to	0	2	3
Benzyl chloride, technical.....lb.	0	2	0	to	0	2	3
Betanaphthol.....lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical.....lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis.....lb.	0	3	3	to	0	3	6
Dichlorobenzol.....lb.	0	0	9	to	0	0	10
Diethylaniline.....lb.	0	4	6	to	0	4	9
Dinitrobenzol.....lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol.....lb.	0	0	11	to	0	1	0
Dinitronaphthalene.....lb.	0	1	4	to	0	1	5
Dinitrotoluol.....lb.	0	1	4	to	0	1	5
Dinitrophenol.....lb.	0	1	6	to	0	1	7
Dimethylaniline.....lb.	0	2	9	to	0	3	0
Diphenylamine.....lb.	0	3	6	to	0	3	9
H-Acid.....lb.	0	4	9	to	0	5	0
Metaphenylenediamine.....lb.	0	4	0	to	0	4	3
Monochlorobenzol.....lb.	0	0	10	to	0	1	0
Metanilic Acid.....lb.	0	5	9	to	0	6	0
Metatoluylenediamine.....lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7).....lb.	0	8	6	to	0	9	6
Naphthionic acid, crude.....lb.	0	2	6	to	0	2	8
Naphthionate of Soda.....lb.	0	2	6	to	0	2	8
Naphthylamin-di-sulphonic acid.....lb.	0	4	0	to	0	4	3
Nevill Winther Acid.....lb.	0	7	3	to	0	7	9
Nitrobenzol.....lb.	0	0	7	to	0	0	8
Nitronaphthalene.....lb.	0	0	11½	to	0	1	0
Nitrotoluol.....lb.	0	0	8	to	0	0	9
Orthoamidophenol base.....lb.	0	12	0	to	0	12	6
Orthodichlorobenzol.....lb.	0	1	0	to	0	1	1
Orthotoluidine.....lb.	0	0	10	to	0	0	11
Orthonitrotoluol.....lb.	0	0	3	to	0	0	4
Para-amidophenol, base.....lb.	0	8	6	to	0	9	0
Hydrochlor.....lb.	0	7	6	to	0	8	0
Paradichlorobenzol.....lb.	0	0	9	to	0	0	10
Paranitraniline.....lb.	0	2	7	to	0	2	9
Paranitrophenol.....lb.	0	2	3	to	0	2	6
Paranitrotoluol.....lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled.....lb.	0	12	0	to	0	12	6
Paratoluidine.....lb.	0	5	6	to	0	5	9
Phthalic anhydride.....lb.	0	2	6	to	0	2	9
Resorcin, technical.....lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude.....lb.	0	0	10	to	0	0	11
Tolidine, base.....lb.	0	7	3	to	0	7	9
Mixture.....lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

	ESSENTIAL OILS.	£	s.	d.
Anise.....c.i.f. 1/9 spot	0	1	11	
Bay.....	0	12	0	
Bergamot.....	0	12	0	
Cajaput.....	0	3	6	
Camphor, white.....firm, per cwt.	4	0	0	
Brown.....	3	15	0	
Cassia.....c.i.f. 10/- spot	0	11	6	
Cedarwood.....	0	1	4½	
*Citronella (Ceylon).....c.i.f. 3/3 for Sept. shipment, spot	0	3	10	
(Java).....c.i.f. 4/-	0	4	2	
Clove.....firm	0	7	6	
Eucalyptus.....	0	2	2	
Geranium Bourbon.....	1	10	0	
Lavender.....dearer and firm	0	16	6	
Lavender spike.....	0	3	0	
Lemon.....easier	0	2	11	
Lemongrass.....per oz.	0	0	2½	
Lime (distilled).....	0	4	0	

* Spot very scarce, practically none obtainable.

Orange sweet (Sicilian).....easier	0	12	0
(West Indian).....	0	9	6
Palmarosa.....	1	3	0
Peppermint (American).....dearer and firm	0	13	6
Mint (dementholised Japanese) dearer, very firm & scarce	0	10	0
Patchouli.....	1	10	0
Otto of Rose.....per oz.	1	15	0
Rosemary.....	0	1	7
Sandalwood.....	1	6	0
Sassafras.....	0	6	6
Thyme.....2/6 to	0	8	0

SYNTHETICS.

Benzyl acetate.....	0	3	0
Benzoate.....	0	3	0
Citral.....	0	10	0
Coumarine.....	0	18	6
Heliotropine.....	0	8	0
Ionone.....	1	5	0
Linalyl acetate.....	1	2	6
Methyl salicylate.....	0	2	6
Musk xylol.....	0	11	0
Terpeniol.....	0	3	0

Sir S. W. Royse's Monthly Report

THERE has been little movement in business during August, the holidays having accentuated the general position, but prices have on the whole remained steady. It is felt in some quarters that the Near Eastern settlement will bring about some improvement. Some benefit should arise from the reductions in railway rates this month from 60% to 50% above those ruling in January, 1920, but further concessions are looked for. Business in sulphate of copper has been limited, the home-trade requirements being small, and there having been little enquiry for export. Prices are nominally unchanged but large parcels could no doubt be obtained for less. The call for green copperas has been better, but prices are still low. Some falling away in the demand for acetate of lime has affected values, which are easier, but the quantities offering are not large. Acetic acid and acetate of soda have been in good request. Acetates of lead are in better supply and are selling steadily at full rates, but nitrate of lead has been quiet. There has been an increased demand for carbonate and caustic potash, and prices remain firm. Little business has passed in Montreal potashes and prices are lower, although advices from Canada state that production is affected by the labour shortage. The demand for yellow prussiates of potash and soda continues disappointing, and still lower figures have been accepted for prompt clearance of stocks. Arsenic has been less called for and price is easier, but the forward position is firmer in the expectation of an increased autumn export demand. Values of tartaric acid and cream of tartar have been affected by the foreign exchanges, continental makers having reduced prices, and business is confined to early delivery. Lower figures are being accepted for citric acid also. There is no change to report in bichromates or chlorates, but nitrate of soda is rather scarce on spot. A good trade has been passing in borax and boracic acid for both home and export account. Stocks of oxalic acid have been pressed for sale and lower figures accepted. Alum and sulphate of alumina have been in only moderate request and keen competition continues from continental makers. The price of white caustic soda has been reduced by £2 per ton for solid and 15s. per ton for liquid. Some concession also has been made in the price of bleaching powder. In tar products business is still difficult to arrange. The reduction in the price of benzol does not seem to have materially increased the demand, and buyers are not disposed to cover ahead, anticipating still lower figures. Toluol remains steady. Solvent naphtha is in little request and is easier. Creosote oil is unchanged. The demand for dehydrated tar has fallen off considerably and the end of the season is in sight. Naphthalenes are little called for and lower prices are quoted for the crude qualities. In pitch the situation is difficult, for though makers are showing a disposition to accept lower figures, there is still a wide margin between their views and those of the consumers. Continental briquette makers, having apparently pitch in hand for their sales of briquettes, are awaiting developments. The unsettled condition of the coal market is affecting the sale of briquettes and the whole position is less strong than formerly. Sulphate of ammonia is unchanged.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, September 6, 1923.

DURING the past week the heavy chemical market has shown little improvement, inquiries being, if anything, fewer than a week ago.

Prices of home products are fairly steady, but Continental quotations incline to be higher.

Industrial Chemicals

ACID ACETIC, GLACIAL.—98/100%, £60 to £64 per ton in casks; 80% pure, £50 to £53 per ton; 80% technical, £47 to £48 per ton, c.i.f. U.K. ports, duty free.

ACID BORACIC.—Unchanged. Crystals or granulated, £50 per ton; powdered £52 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC (ICE CRYSTALS).—Inclined to be lower at about 1s. 1½d. per lb.

ACID CITRIC.—Unchanged at about 1s. 5½d. per lb., less 5 per cent.

ACID FORMIC 80%.—Still on offer at about £50 to £51 per ton, ex store.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC 80%.—About £23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Unchanged at about 6d. per lb.

ACID SULPHURIC.—144°, £3 15s. per ton; 168°, £7 per ton, ex works, full truck loads. De-arsenicated quality, 20s. per ton more.

ACID TARTARIC.—B.P. crystals. Now quoted 1s. 2½d. per lb. less 5 per cent., ex store.

ALUM, CHROME.—Quoted £23 to £26 per ton f.o.b. U.K. ports.

ALUM, POTASH (LUMP).—Continental quotations higher at about £10 5s. per ton c.i.f. U.K. Spot lots obtainable at about £11 10s. per ton, ex store.

ALUMINA, SULPHATE.—17/18%, £10 15s. per ton; 14/15%, £7 10s. per ton, c.i.f. U.K. port.

AMMONIA ANHYDROUS.—In little demand. Price remains unchanged at 1s. 5d. per lb.

AMMONIA CARBONATE.—Lump, 4d. per lb.; ground, 4½d. per lb. delivered.

AMMONIA LIQUID 880°.—Quoted at 3½d. per lb., ex station.

AMMONIA MURIATE.—Grey galvanizers quality £32 to £33 per ton. Fine white crystals offered from continent at £23 15s. per ton, c.i.f. U.K.

AMMONIA SULPHATE.—25½%, £12 17s. per ton; 25¾% neutral quality, £14 per ton ex works, August/September.

ARSENIC, WHITE POWDERED.—Makers' prices slightly reduced for forward delivery, spot lots still quoted about £73 to £74 per ton, ex wharf.

BARIUM CHLORIDE.—98/100%. Spot lots offered at £15 per ton, ex store. Offered from continent at £13, c.i.f. U.K.

BARYTES.—Finest white English £5 5s. per ton, ex works.

BLEACHING POWDER.—Makers advise reduction of 2s. 6d. per ton. Now £11 5s. per ton, ex station, spot delivery contracts 20s. per ton less.

BORAX.—Granulated £26 10s. per ton. Crystal, £27 per ton. Powdered, £28 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English make unchanged, £5 12s. 6d. per ton, ex station. Continental material now quoted about £5 per ton, c.i.f. U.K.

COPPERAS, GREEN.—About £2 2s. 6d. per ton, f.o.b. U.K. port.

FORMALDEHYDE 40%.—Spot lots on offer at about £94 to £95 per ton, ex wharf.

GLAUBER SALTS.—Fine white crystals quoted £3 15s. per ton, ex store.

LEAD, RED.—English makers' price, £40 per ton, carriage paid U.K. stations. Continental material about £34 15s. per ton, ex store.

LEAD, WHITE.—Offered from continent at £36 per ton, c.i.f. U.K. ports.

LEAD ACETATE.—White crystals quoted £40 to £41 per ton, ex wharf, spot delivery. Offered from continent at £39 10s. per ton, c.i.f. U.K.

MAGNESITE, GROUND CALCINED.—English burnt material, £8 5s. per ton, ex station. Finest continental about £7 5s. per ton, c.i.f. U.K. ports.

MAGNESIUM CHLORIDE.—Continental prices very much higher, offered at about £3 to £3 5s. per ton, c.i.f. U.K. ports. Small spot lots still available at about £2 15s. per ton, ex store.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial quality, £7 per ton. B.P. quality, £8 5s. per ton, ex station.

POTASH, CAUSTIC.—88/92%. Spot lots offered at about £31 per ton, ex wharf.

POTASSIUM BICHROMATE.—Unchanged at 5½d. per lb. delivered.

POTASSIUM CARBONATE.—96/98% quoted £28 10s. per ton, c.i.f. U.K.; spot lots about £29 5s. per ton, ex store. 90/92% quality about £27 10s. per ton, ex store.

POTASSIUM NITRATE (SALTPETRE).—Offered at £23 per ton, c.i.f. U.K. port.

POTASSIUM CHLORATE.—Unchanged at about 3d. per lb.

POTASSIUM PERMANGANATE.—B.P. crystals on offer at 10½d. per lb., ex store.

POTASSIUM PRUSSATE (YELLOW).—Now quoted at 1s. 1d. per lb., ex store.

SODA, CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62%, broken, £19 2s. 6d. per ton; 98/99%, powdered, £22 15s. per ton. All ex station, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Quoted £25 10s. per ton, ex store, spot delivery. About £24 per ton, ex wharf, prompt shipment from continent.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4½d. per lb., delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Alkali 58%, reduction of 1s. 3d. per ton, now £8 14s. 0d. per ton, ex quay.

SODIUM HYPOSULPHITE.—Continental commercial crystals offered at £7 15s. per ton, c.i.f. U.K. Spot lots about £9 10s. per ton, ex store. Pea crystals, £14 10s. per ton, ex store.

SODIUM NITRATE.—Refined, 96/98%, unchanged at about £13 7s. 6d. per ton, f.o.r. or f.o.b. U.K. port.

SODIUM NITRITE.—100%, £26 to £28 per ton, according to quantity.

SODIUM PRUSSATE (YELLOW).—Still further reduced. Now quoted about 6½d. per lb., ex store.

SODIUM SULPHATE (SALTCAKE).—Unchanged at about £4 per ton, ex station, for home consumption. Higher prices for export.

SODIUM SULPHIDE.—60/62% solid. Continental offers slightly higher at about £13 15s. per ton, c.i.f. U.K. port. Spot lots, £14 10s. per ton, ex store.

SULPHUR, Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton; prices nominal.

TIN CRYSTALS.—Unchanged at 1s. 4d. per lb.

ZINC CHLORIDE.—English material, about £25 per ton. Continental, about £23 per ton, c.i.f. U.K. ports.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—Home inquiries. Price 1s. 6½d. per lb., delivered.

BENZIDINE BASE.—Substantial export inquiries. Price quoted 4s. 6d. per lb., 100% basis, f.o.b.

BENZYL CHLORIDE, TECHNICALLY PURE.—Price 1s. 10d. per lb. delivered, returnable drums.

BETA NAPHTHOL.—Large home inquiries. Price 1s. 0½d. to 1s. 1d. per lb., delivered.

BETA NAPHTHYLAMINE.—Large home and export inquiries. Price quoted 4s. per lb. delivered, or f.o.b. U.K. port.

CHROMOTROPE ACID.—Export inquiry. Price 10s. per lb. 100% basis, f.o.b. U.K. port.

GAMMA ACID.—Export inquiries. Price quoted: 12s. 7d. per lb. 100% basis, f.o.b. U.K. port.

"H" ACID.—Large export inquiry. Price quoted 4s. 8d. per lb. 100% basis, f.o.b.
 METHYL ALCOHOL, 99/100% (MAXIMUM 0.1% ACETONE).—Market considerably weaker. Supplies offered at £84 per ton, c.i.f., drums free.
 MONO-ETHYLANILINE.—Some home inquiry. Price quoted, 4s. 8d. per lb. delivered, drums returnable.
 NAPHTHALENE POWDER.—Supplies are offered at £16 per ton.
 PARANITRANILINE.—Home inquiries. Price 2s. 7d. per lb., delivered.
 TOLUIDINE.—Large export inquiries. Price 1s. 5d. per lb. f.o.b.

The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT).

Manchester, September 6, 1923.

THE improved tone on the Manchester chemical market, referred to here last week, has been fairly well maintained. Home buyers, though still cautious, are operating more freely than they have done for some time. The market, however, cannot be described by any means as active generally. On foreign account, business, as before, is largely confined to a number of the principal "heavies," mainly for the Colonies. Prices during the week have kept up, few fresh "cuts" having to be reported.

Heavy Chemicals

Saltcake is steady at £5 5s. per ton delivered, but remains a quiet section of the market. Glauber salts are also inactive, though prices are maintained at about £4 per ton. Caustic soda is selling rather freely for both branches of trade; home consumption prices are steady at £16 17s. 6d. per ton for 60 per cent., £17 17s. 6d. for 70 per cent. and £19 7s. 6d. for 76-77 per cent. material. Alkali is also being readily taken up with prices firm at £7 12s. 6d. per ton for 58 per cent. material. Soda crystals keep quiet but steady at £5 5s. per ton delivered. Bicarbonate of soda is only in moderate demand, though prices are maintained at £10 10s. per ton delivered. Bleaching powder is steady at £11 5s. per ton to home consumers, a fair business being put through both on home and foreign account. Prussiate of soda is inactive at ½d. per lb. Hyposulphite of soda also keeps very quiet, and prices are a shade weaker at £13 to £13 10s. per ton for photographic crystals and £9 10s. per ton for commercial. Sodium sulphide shows little sign of improvement; prices, however, are steady at £14 10s. to £15 per ton for 60-65 per cent. concentrated solid and £8 per ton for crystals. Nitrite of soda meets with a fairly active demand, and as supplies are still on the short side prices are very firm at round £26 10s. per ton. Sodium chlorate is on offer at 2½d. to 2¾d. per lb., with only a moderate amount of business being done. Phosphate of soda keeps quiet but steady at £15 per ton. Bichromate of soda is firm and in moderate demand at 4½d. per lb. Acetate of soda is quietly steady at £24 to £24 10s. per ton.

Caustic soda is steady and fairly active at round £28 10s. per ton for 88-90 per cent. material. Carbonate of potash is in moderate inquiry at £26 to £27 for 90-92 per cent. and £29 per ton for 96-98 per cent. Yellow prussiate of potash is quiet but about unchanged at 1s. 1½d. per lb. The demand for permanganate of potash is still on a small scale, though price is maintained at 9½d. per lb. Bichromate of potash is steady and fairly active at 5¾d. per lb. Chlorate of potash is in fair demand at 2¾d. to 3d. per lb.

There is as yet no sign of an expansion of the demand for sulphate of copper, and prices, in consequence, lack firmness with values ranging from £25 10s. to £26 per ton, f.o.b. The demand for arsenic is also less pressing, and Cornish brands have to meet Continental competition; to-day's value of white powdered, Cornish makes, is about £70 per ton, Manchester. Nitrate of lead is unchanged at £42 per ton, but trade in this material is still rather quiet. Prices of sugar of lead are very firm on scarcity; white is quoted at £40 to £41 and brown round £42 per ton. Commercial Epsom salts are quiet but fairly steady at £4 per ton, with magnesium sulphate, B.P., on offer at £6. Acetate of lime is firm at £20 to £21 for grey and £12 per ton for brown.

Acids and Tar Products

Tartaric acid is only in quiet demand, but prices are steady at 1s. 2½d. per lb. Citric acid is easier at about 1s. 6d. on

comparatively good offerings. Oxalic acid remains a very dull section, though the price is about unchanged from last week at 5½d. per lb. Acetic acid is very firm at £48 per ton for 80 per cent. technical; glacial is on offer at about £65 per ton.

Actual business in pitch is quiet, though the shipping season opens in a week or two; to-day's quotation is more or less nominal at round £7 per ton Manchester. Creosote oil is steady at 8½d. per gallon, though little business is being done. Solvent naphtha is also quiet at 1s. 4½d. per gallon. Supplies of carbolic acid are not excessive; crude is still quoted at 3s. 4d. per gallon, with crystals at about 1s. 2½d. per lb. There has been little change in the position of naphthalene, demand being quiet and prices steady; refined is on offer at round £20 per ton and crude £7 to £13 according to grade.

The Importance of Metallurgy

PROFESSOR J. C. THOMPSON, of the University of Manchester, writing on "The Importance of Metallurgy," in the *Manchester Guardian*, stated that the two sciences, chemistry and metallurgy, each owe an enormous debt to the other. Among the more important of the services which the metallurgist had been enabled to render to the chemist he mentioned the production of the numerous non-corroding alloys such as high silicon cast iron or the nickel-chrome alloys which, from their acid and heat-resisting qualities, had proved of invaluable assistance. Further, it had been the metallurgist who had worked out many of the standard methods of analysis of metallurgical products of equal service to the pure chemist, while finally the latter had had placed at his disposal in bulk, metals and alloys which were formerly little more than scientific curiosities. In the present state of interdependence of all the applied sciences it was dangerous to claim for any one of them an outstanding priority, but if any was to be acclaimed as the fundamental or basic science metallurgy had a claim which was inferior to few. Not only the chemist, but the engineer of whatever kind, the surgeon, the dentist and others were all largely dependent on metallurgy to a large extent.

There were many problems still awaiting solution, particularly in connection with alloys, and in this connection Professor Thompson referred to the new Metallurgical Department which is being opened at Manchester University. Although certain of the problems were beyond the scope of academic research, there still remained many which could be investigated with greater chances of rapid elucidation under the conditions offered in such an institution. The work was, however, still hampered by lack of funds for the endowment of departments for the provision of scholarships and the necessarily expensive apparatus and materials for such research.

A Device for Sulphur Bleaching

A SIMPLE device is reported from America for use in connection with bleaching processes in which sulphur is burned in an open pan in a room containing the articles to be bleached. Owing to the difficulties arising from the formation of a scum it has not been possible to use crude sulphur for this work, but it has been found that if a pile of shallow trays are used instead of a single one, then it is possible to keep the sulphur burning gently, and to avoid the formation of scum.

Recent Wills

Mr. Thomas Gott Parkinson, wholesale chemist, of Carlton House, Burnley	£41,286
Alderman Charles Joseph Bishop, glass manufacturer, of St. Helens, Lancs (net personalty, £72,402)	£75,715
Mr. Harry Kearsley, of Worthing, formerly managing director of R. Kearsley and Co., varnish manufacturers, Ripon (net personalty £36,183)	£37,624
Mr. Frederick Giles Hunt, chairman of Joseph Crossfield and Sons (now amalgamated with Lever Bros.), of William Gossage and Sons and of the China Soap and Candle Co. (net personalty, £57,531)	£75,758

Company News

ARNOLD J. VAN DEN BERGH.—A dividend of 10 per cent. for the year to April 30 last was payable on September 3.

PINCHIN, JOHNSON AND CO.—An interim dividend is announced for the half-year ended June 30 last at the rate of 6 per cent. actual on the ordinary shares.

BURT, BOULTON AND HAYWOOD, LTD.—The directors announce a dividend of 4 per cent., free of tax, on the ordinary shares for the half-year ended June 30 last, making 8 per cent., free of tax, for the year.

PEACHEY LEATHER PRODUCTS.—The director reports that the cash received by the company in respect of the 125,000 shares recently allotted was £99,997. The preliminary expenses amounted to £7,799. Cash in the bank and in hand on August 22 amounted to £27,019.

SPICERS, LTD.—The gross profit for the year ended March 31 last amounted to £391,108, and £75,098 was brought forward, making a total of £466,206. After deducting salaries, rates, taxes, directors' fees, other expenses, debenture interest, etc., there remains a balance of £106,379 to be dealt with. The final dividend on the preference shares absorbs another £16,250, and it is proposed to pay a dividend for the year on the ordinary shares of 4 per cent., the balance of £70,129 being carried forward.

DOMINION TAR AND CHEMICAL CO.—The report for the half year ended June 30 last states that the net profits for the period under review were £49,321 (against £29,955 in the corresponding half-year of 1922). It is proposed to place £20,800 (against nil) to depreciation account, and to pay a final dividend for the half-year of 2½ per cent., free of tax, making a total distribution of 5 per cent. for the half-year. The sum of £10,000 (against £8,130) is carried to general reserve, and £6,021 is carried forward. Meeting, Salisbury House, September 10, at noon.

AMERICAN CYANAMID CO.—The accounts for the year ended June 30 show a net income of \$1,878,089, excluding profits of subsidiary companies. Sundry credits, less charges affecting years prior to June 30, 1922, are shown as \$50,100. With the surplus balance as at June 30, 1922, of \$3,143,276, there is a total of \$5,071,466 available. After deducting losses on abandoned equipment (\$6,613), goodwill written off (\$2,216,804), and reserve for contingencies (\$950,000) there remains \$1,898,049. The dividend on the preferred and common stocks absorbed \$401,697, leaving a surplus as at June 30, 1923, of \$1,496,351.

F. STEINER AND CO., LTD.—The directors report that after adjustment of excess profits duty, etc., and deducting £190,212 for repairs and depreciation, the profits for the period of three years is £241,495, which, with £35,287 brought in, makes a total of £276,783. After paying debenture interest and preference dividend for three years and 5 per cent. on the ordinary shares for the years 1920-1 and 1921-2, the available balance is £107,783, out of which the directors have placed £30,000 to general reserve and recommend a dividend of 7½ per cent. for the past year on ordinary shares, leaving £42,158 to be carried forward.

BROKEN HILL PROPRIETARY BLOCK 14.—The report for the half-year to March 31 last, submitted at the meeting held in Melbourne on May 28, states that financial arrangements have been made with the Associated Smelters whereby active operations have again been made possible after a cessation of production practically extending over a period of four years. For half-year practically no work of consequence was done on the mine beyond pumping and general maintenance. Mine and plant have been kept in good condition, and, by new arrangement with the Smelters Co., ore extraction is now proceeding by working only one shift, but it is anticipated two shifts will be going in a week or two. The ore is being sent to Block 10 mill for treatment on same terms as in old contract, when both companies worked conjointly with success. The accounts show a loss for the half-year of £5,769, and, after deducting therefrom the credit balance of £4,292 brought in, a debit of £1,477 is carried forward.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIAL.	REF. No.
Germany.....	Oils (lubricating and for industrial purposes)	278

"Chemical Age" Inquiry List

The following inquiry has been received from a reader of "The Chemical Age." Replies addressed to the box number given below, c/o "The Chemical Age," 8, Bowyer Street, London, E.C.4, will be forwarded to the inquirer.

SOAP MAKING PLANT FOR SPAIN.—A Spanish engineer, who has been commissioned by a new company to erect works for soap manufacture, is anxious to obtain from British plant manufacturers particulars of machinery, apparatus, etc., with catalogues.—H.29.

Tariff Changes

BRITISH INDIA.—The Acts providing for the levy of a cess on exported indigo have been repealed.

NEW CALEDONIA (FRENCH).—Modifications have been introduced in the import tariff for a number of articles including the following:

	Import Duty	
	General	Minimum.
Spirits of turpentine, per 100 kilograms	24 fr.	12 fr.
Carbide of calcium, per 100 kilograms	12 "	6 "
Oxygenated water	30% ad val.	15% ad val.
Sulphuric acid, per 100 kilograms	8 fr.	4 fr.

Contracts Open

Tenders are invited for the following articles. The latest dates for receiving tenders are, when available, given in parentheses:

SOUTH AFRICA.—Tar or tar substitute. Applications for further particulars should be addressed to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. Reference No. 11,996/E.D./C.C./2.

VENICE.—Oil mill plant. Particulars from the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. Reference No. 20,441/F.W./C.C./2.

Creosote for Bulgaria

H.M. Legation at Sofia reports that the Bulgarian State Railways are desirous of receiving tenders for the supply of 500 tons of creosote to the approximate value of 3,500,000 leva. A public adjudication of tenders will be held on September 28 1923. Applications from United Kingdom firms for further particulars should be addressed to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. Reference No. 11456/FE/CC(2).

Sodium Acetate for Australia

H.M. Senior Trade Commissioner in Australia (Mr. S. W. B. McGregor) reports that the Victorian Railways Commissioners are calling for tenders to be presented before October 17, 1923, for the supply of fifteen tons of sodium acetate (commercial). Applications from United Kingdom firms for further particulars should be addressed to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1, quoting reference No. 12039/E.D./C.P.

The American Chemical Exposition

By a vote of the exhibitors it has been decided not to hold the American Chemical Exposition in 1924, about 60 per cent. of the exhibitors being in favour of holding it every two years. The exposition this year is being held at the Grand Central Palace, New York, from September 17 to 22.

THE BRITISH ALIZARINE COMPANY LTD.

Manchester**London****Glasgow**

Manufacturers of Alizarine Dyestuffs

ALIZARINE RED
(all shades)

ALIZARINE BORDEAUX

ALIZARINE GREEN
(soluble and insoluble)

ALIZARINE RED S. POWDER

ALIZARINE (MADDER) LAKES
(of all qualities)ALIZUROL GREEN
(Viridine)

ALIZANTHRENE BLUE

ALIZANTHRENE YELLOW

Other fast colours of this series in course of preparation

Anthraquinone, Silver Salt and all intermediates of this series

CHROME TANNING and other Chrome Compounds

ALIZARINE BLUES
(soluble and insoluble)

ALIZARINE CYANINE

ALIZARINE ORANGE

ALIZARINE BLUE BLACK

ALIZARINE MAROON

ANTHRACENE BROWN

ALIZANTHRENE BROWN

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663 TRAFFORD PARK, MANCHESTER
550 EAST LONDON
2667 DOUGLAS, GLASGOW

TELEGRAMS
BRITALIZ MANCHESTER
BRITALIZ LONDON
BRITALIZ GLASGOW

All communications should be
addressed to

The British Alizarine Co., Ltd.
Trafford Park, Manchester

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

BLUNT (W. H.) AND SON, 70, Snow Hill, Birmingham, chemists. (C.C., 8/9/23.) £10 13s. 10d., July 25; and £16 11s. 9d., July 17.

DIAMOND SODA SYNDICATE, 101, Leadenhall Street, E.C., dealers. (C.C., 8/9/23.) £22 1s. 10d. June 13.

TOMLINSON, Herbert, 7, Alexander Terrace, Undercliffe, Bradford, analytical chemist. (C.C., 8/9/23.) £20 11s. 6d. July 26.

WENYON, Conrad G., and wife, 58, Bankfield Road, Huddersfield, analytical chemist. (C.C., 8/9/23.) £15 10s. 6d. June 29.

Receiverships

GODDON AND CO., LTD. (R., 8/9/23.) J. W. Dodds, of Boxmoor House, Boxmoor, Herts, was appointed Receiver and Manager on August 23, under powers contained in debenture dated January 23, 1923.

VEGLINE OIL REFINERY AND CHEMICAL WORKS, LTD. (R., 8/9/23.) E. S. Foden, of 15-16, Merchants Exchange Docks, Cardiff, was appointed Receiver on August 27, 1923, under powers contained in debentures dated October 3, 1921.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

AUSTIN AND SON (NECHELLS), LTD., manufacturing confectioners, chemists, etc. (M., 8/9/23.) Registered August 23, £669 17s. debenture, to A. J. Corral, 395, Nechells Park Road, Birmingham, manufacturing confectioners; general charge.

MORDLE (F. DARE) AND CO., LTD., Nottingham, starch manufacturers. (M., 8/9/23.) Registered August 27 (by order on terms), transfer of mortgage dated February 2, 1922, securing £4,000, to H. J. Hallam, Low Pavement, Nottingham, estate agent; charged on Springfield Works, etc., Radford Road, Basford. *£7,000. April 30, 1923.

TAYLORS' DRUG CO., LTD., Leeds. (M., 8/9/23.) Registered August 27, £800 mortgage, to Mrs. E. Speight, 101, Harrogate Road, Leeds, and others; charged on property in Market Street, Hemsworth. *£74,796 os. 3d. January 3, 1923.

WELSH DRUG HOUSES, LTD., Mountain Ash. (M., 8/9/23.) Registered August 27, £600 debentures; general charge (subject to mortgage dated August 16, 1923).

Satisfaction

CARTER (JOHN J.) AND SONS, LTD., Southampton, dyers, etc. (M.S., 8/9/23.) Satisfaction registered August 22, £100, part of amount outstanding July 1, 1908.

London Gazette

Company Winding Up Voluntarily

HUGHES, LYMAN AND CO., LTD. (C.W.U.V., 8/9/23.) Frederick H. Thornton, Chartered Accountant, 41-43, Castle Street, Liverpool, appointed Liquidator.

Notice of Dividend

KEENE, Irving Alexander, described in the Receiving Order as THE KEENE COMPANY, 52, Gray's Inn Road, London, manufacturing chemists. First and final dividend of 3s. 6½d. per £, payable September 12, 28, Kimberley House, Holborn Viaduct.

New Companies Registered

CYANAMID PRODUCTS, LTD., 232, Salisbury House, London Wall, E.C.2. Manufacturers, refiners, importers and exporters of and dealers in cyanamid, cyanide and other chemicals and chemical products, etc. Nominal capital, £5,000 in £100 shares.

H. EDWIN COLEY, LTD., 6, Bury Court, St. Mary Axe, London, E.C.3. Mineralogists, metallurgists, analysts and scientific and chemical inventors and investigators in connection therewith, etc. Nominal capital, £21,500 in 30,000 "A" ordinary shares of 1s., and 10,000 "B" ordinary and 10,000 10 per cent. participating preference shares of 1s.

H. EDWARD HOPE AND CO., LTD., 21, Lower Mall, Hammersmith, W. Manufacturers of and dealers in distempers, enamels, pigments, oils and colouring materials, disinfectants, liquid and other manures, etc. Nominal capital, £7,000 in £1 shares (6,000 5 per cent. cumulative preference and 1,000 ordinary).

ROSE AND TATE (DONCASTER), LTD., 27, High Street, Doncaster. Lime, iron ore, gravel and slag merchants; manufacturers of coke and chemical products, coal tar by-products, cement, etc. Nominal capital, £1,000 in £1 shares.

British Catalogues for Canada

H.M. SENIOR TRADE COMMISSIONER in Canada (Mr. R. W. Dalton) has informed the Department of Overseas Trade that there is a serious lack of British catalogues in the various Trade Commissioners' offices in Canada. He points out that without such catalogues it is often a difficult matter to advise firms in Canada as to possible British sources of supply, and that the necessity of referring inquiries to headquarters in London takes time, during which business that might otherwise have gone to British firms is lost to them. United Kingdom firms desirous of ensuring their names being given to suitable inquirers should forward copies of their catalogues to any, or all, of the following: H.M. Senior Trade Commissioner in Canada, 285, Beaver Hall Hill, Montreal; H.M. Trade Commissioner, 24, Adelaide Street West, Toronto; H.M. Trade Commissioner, 210 Winch Building, Vancouver; The Chief Clerk, Office of H. M. Trade Commissioner, 703, Union Bank Buildings, Winnipeg. It should be noted that Customs duty is levied on catalogues entering Canada, and firms desiring to send them by parcel post should prepay such duty. For this purpose stamps may be obtained from the office of the High Commissioner for Canada, Kinnaird House, Pall Mall East, London, S.W.1.

United Indigo and Chemical Co.

MR. GEORGE HEYWOOD, the chairman of the United Indigo and Chemical Co., speaking at the annual meeting, said there was little or nothing to guide them in the midst of the present trade depression. Their developments in the manufacture of synthetic dyes and dyestuffs had been fully justified, because they had enabled the Company to occupy a stronger position with their customers, and had opened the door to many important concerns. The moment they could see clearly ahead would be the time to expand. Mr. Harrison, in seconding the resolution for the adoption of the report, which was carried, said there were reports that Germany was putting forth great efforts to recover at least some of her former trade in the dyeing industry. The German monopoly had been broken temporarily, if not permanently, but the directors of the Company would have to face a time of stress in the future. The Company, he thought, was strong enough to stand the stress, despite the fact that German and Swiss firms were uniting for the purpose of competition.

